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PHYSICIANS' USE OF AMBULATORY CARE RESOURCES IN A PREPAID GROUP PRACTICE HMO

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CONTENTS

Executive Summary 1

Introduction 3
- Objectives 3
- Background 3
  - Physicians' Use of Medical Care Resources 3
  - Factors Related to Resource Use 7
  - Specific Study Objectives 13

Design 14
- Research Setting and Data Sources 14
  - The Physician Survey 15
  - Physician Demographic and Professional Background File 16
  - The Physician Availability File 16
  - The Outpatient Information System 16
  - KPMCP Membership Information and the HSRC Calendar File 17
- Study Population 17
- Measures 19
  - Resource Use 19
  - Independent Variables-Factors Related to Resource Use 21
- Analysis Techniques 25

Findings 27
- Resource Use Patterns 27
- Factors Related to Resource Use-Bivariate Analysis 29
- Factors Related to Resource Use-Multivariate Analysis 33

Summary and Conclusions 34

References 39

EXECUTIVE SUMMARY

The purpose of this study was to determine the extent of variation in physician behavior concerning the use of outpatient medical care resources and to ascertain the factors which accounted for this variation. The setting was a large prepaid group practice HMO which serves 260,000 members. Physicians from the departments of internal medicine, pediatrics, and obstetrics/gynecology were included in the study. Detailed data on physicians' characteristics were collected through an extensive survey. A dollar measure of each physician's aggregate outpatient resource use was developed for this study. The measure reflects major components of physician-directed ambulatory care.

The main study findings were:

- There was significant variation among physicians in each specialty in the use of outpatient medical care resources even after adjusting for patient age and morbidity (casemix).
- Physicians within each specialty tended to be consistent in their resource use patterns over a three-year period. Physicians who were high, medium, or low users in one year tended to maintain these relative positions from year to year.
- Some consistency in use was found across resource components, for example, lab and x-ray. However, there was little tendency for physicians to have similar patterns over all categories.
- Aggregate outpatient resource use by physicians was positively correlated with hospital admission rates, a finding contrary to previous assumptions. Outpatient care did not appear to be a substitute for use of inpatient services.
- After adjusting for patient age and morbidity, specialty of physician accounted for approximately 70 percent of the variation in total outpatient use rates among physicians in this setting. This finding confirms the importance of controlling for specialty when analyzing the utilization behavior of individual physicians.
- Factors related to differences in outpatient resource use among physicians included years since graduation, medical school training and level of current involvement in medical education. Generally, these results were consistent with past research. The presence and strength of these relationships varied by specialty. In addition, years with the KPMCP, influence and leadership in the medical group, attitudes toward patients, satisfaction with workload, and being the patient's regular doctor were also associated with differences in resource use

among physicians. The importance of these factors also varied with specialty. Both medical training and the work setting appear to influence physicians' practice patterns relative to resource use.

- The results of a multivariate analysis indicated that few nonmedical factors were statistically significant when their simultaneous effects were analyzed. The major trends remained, however.

This study was conducted in one large prepaid group practice. Results may not be generalizable to other settings. The number of physicians studied was small which also means that any generalizations should be made with caution. Replication in other settings is needed and further studies are called for to examine factors related to specific components of resource use, such as laboratory and radiology services and drugs.

This study found considerable variation among individual physicians in the rates of use of aggregate outpatient services and procedures in each specialty, even after adjusting for casemix. These differences suggest that there may be substantial resource use within each specialty which may or may not be necessary or medically appropriate. There seems to be considerable potential for cost reduction through more judicious use of outpatient services and procedures. Ongoing studies of physician utilization behavior and regular planned education and intervention strategies to encourage efficient use of outpatient services and procedures seem called for in HMO's and other settings.

These results point out the continuing need for comparing the quality of care with the quantity of services provided. Medical educators, HMO managers and physicians, and policy makers, when faced with balancing scarce resources among competing demands, will increasingly be forced to weigh the benefits of technology and the use of technology by physicians against the associated costs. Until there is a better knowledge of the relationship between quantity and quality, effective decisions and policy will remain elusive.

INTRODUCTION

Objectives

Study objectives were: (1) to investigate the extent of variation in physician behavior regarding the use of ambulatory medical care resources and (2) to determine the factors which account for this variation. The setting is a large prepaid group practice HMO.

The way physicians use medical care resources directly relates to problems of costs and efficiency, which are key issues in the organization and financing of medical care. Understanding how and why physicians differ in their patterns of resource use is essential, therefore, for evaluating alternative forms of medical care delivery, and in formulating health policy to contain medical care costs.

Background

Somers and Somers have stated that 75 to 80 percent of health care expenditures are determined by physicians (40). According to Fuchs, physician behavior controls and determines most medical care costs (12). He estimates that the physicians are responsible for 70 percent of medical care costs consisting of hospitalizations, physicians' services, and drug orders.

These estimates seem to be based upon the assumptions that diagnosis and treatment are decided by the physician, although the initial decision to seek care is the patient's. There may be some sharing of decisions by the patient and physician in terms of follow-up care, but any major decisions about the use of key resources are largely the physician's. Any variation in physician's control is dependent upon the particular services that are being used.

Physicians initially choose the combination of diagnostic and treatment services required by patients and also dictate the setting in which the care is to occur. Physicians decide whether or not to institutionalize the patient and determine the level of care required. They determine what laboratory, radiology, medical, and surgical procedures are needed. They also decide if drug treatment is indicated. Subsequent decisions to continue the use or to order any of these types of services, (particularly the hospital, and laboratory, radiology, and surgical procedures) remain largely physician initiated. On the other hand, the use of some types of services in ambulatory care can be influenced by the patient. Examples include continuing use of the physician for follow-up office visits for a morbidity and the continuing use of drugs. Additional use of different drugs in the episode of care can also be patient initiated.

Physicians' Use of Medical Care Resources--Previous research suggests that there is substantial variation in the quantities and combinations of medical care resources that physicians order. However, only a few studies have controlled for case mix. Also, existing research has focused on the specific components of medical care such as the laboratory, radiology, and drugs. Past research has not attempted to measure total resource use or to determine how physicians' utilization behavior varies relative to an aggregate resource use measure.

Use of the laboratory has been studied most often. A number of researchers have examined the variation in physicians' use of laboratory procedures for outpatients. With the exception of the study by Schroeder et al. (37) and possibly the study by Lyle (26), these studies have not controlled for the effect of patient factors upon laboratory utilization. Accordingly, it is not clear as to how much of the variability is attributable to individual physician behavior and how much is attributable to characteristics of the patient, such as age, morbidity and health status.

Schroeder et al. determined the total laboratory costs for a three-month period among 33 faculty internists caring for similar patients in a university clinic and found a 17-fold variation in these costs among the internists (37). Lyle compared the practice habits of eight internists in a private practice group. He found that from 15 to 36 percent of total visits per physician resulted in a laboratory procedure (26), more than a two-fold difference. Lyle also determined the percentage of total visits that had an electrocardiogram (ECG). This percentage ranged from 3.4 percent to 17.6 percent of total visits (26). Freeborn et al. found that the ratio of laboratory procedures to doctor office visits (DOV) among internists in a prepaid group practice HMO varied from less than one to more than two and one-half laboratory procedures per DOV (9).

Pineault developed a utilization measure of technical services (33). It was defined as the average weighted number of laboratory and radiology procedures used per episode in chronic, acute, and undiagnosed disease by 34 internists. The setting was a prepaid group practice HMO. In computing an average value per physician, each laboratory and radiology procedure was weighted by a relative value derived from a modification of the California Relative Value Studies (1). The average weighted value of technical services per episode in acute diseases ranged from 2.3 to 15.0 among individual internists, almost a seven-fold difference. The same measure for chronic diseases ranged from zero to 49.9 per physician. For undiagnosed diseases, the range was from 6.1 to 31.6, a five-fold difference (33).

Morrison and Riley studied laboratory use (hematology, bacteriology, and biochemistry procedures) among general practitioners in Scotland (29). The range in the rate of use of hospital-based laboratory procedures per 1,000 assigned outpatients was from 0 to 57.9 among 69 practitioners practicing in town and the surrounding area. The range was 3.2 to 45.5 for practitioners located in a health center with easy access to a laboratory (29).

The use of radiology procedures by physicians also has been studied by several investigators. In two widely cited studies, Eisenberg and Nicklin (8) and Childs and Hunter (3) found differences in the use of radiology procedures among specialists but did not compare the behavior of individual physicians within a given specialty. Pineault showed wide variations among internists using a measure that included both radiology and laboratory procedures (33). (This measure was referred to earlier as a measure of the use of technical resources.) Lyle reported that from seven to 21 percent of total visits per physician resulted in an x-ray in the clinic while from 1.4 to 3.8 percent of total visits per physician resulted in x-rays (contrast studies and special procedures) when not done in the clinic (26).

Research has also focused on variation among physicians in their use of prescription drugs. Schroeder et al. calculated the total drug costs for a three-month period among 33 faculty internists caring for similar patients in a university clinic (37). They found a four-fold variation in drug costs. Johnson et al. ascertained prescribing rates for 39 internists serving medically indigent members with similar characteristics in an HMO over a five-year period (23). They reported up to a four-fold difference in the rates among these physicians. They also reported a four-fold difference in the prescribing rates of 20 pediatricians and up to a three-fold difference in the prescribing rates of 12 obstetrician/gynecologists. Lyle reported that from 51 to 64 percent of total visits of eight internists resulted in drugs (26).

Office-related procedures used by physicians also have been analyzed. Pineault developed another measure that he called "clinical" services (33). This measure consisted of the office visits and telephone calls used per episode by internists in acute and in undiagnosed diseases. In computing an average value for each physician for clinical services, each office visit and telephone call was weighted by a relative value derived from a modification of the California Relative Value Studies (1). Pineault found that the average weighted value of clinical services per episode in acute diseases among 34 individual internists ranged from 14.3 to 20.2. In undiagnosed diseases, the range was from 7.0 to 18.9 (33).

Lyle, in examining one aspect of office practice, determined the percent of total office visits per internist that included professional fees. The mean total charge per encounter per internist ranged from $26.12 to $34.09, a difference of approximately 30 percent (26).

Lyle also attempted to show the percentage of total visits for each physician that were judged to be patient-initiated (new problem and new patient visits) and, similarly, those judged to be physician-initiated (summary and follow-up visits) (26). He also calculated the percent of visits where a return visit was ordered. The latter ranged from 33.0 to 64.3 percent among the physicians. Patient-initiated visits ranged from 31.8 to 69.6 percent of total visits while physician-initiated visits per internist ranged from 19.1 to 50.8 percent of total visits (26).

Greenlick et al. examined the annual use of the telephone by 22 internists in a prepaid group practice HMO (15). Considerable differences were found among the internists in their telephone use. The telephone call-to-DOV ratio varied from more than one call per DOV to one call for every five DOVs. Also, the percentage of physician-initiated calls varied substantially among these physicians. However, no attempt was made to control for patient-related factors. As previously described, Pineault examined use of the telephone by individual internists in conjunction with office visits. He also found substantial differences among internists (33).

Hospital admissions is another resource area which has been studied. Lyle reported that the hospital admission rate per physician (measured as the percent of office encounters that resulted in a hospitalization) ranged from 1.4 percent to 5.4 percent of office encounters, almost a four-fold difference (26). He also reported that the average length of stay for these hospitalizations ranged from 6.0 to 10.2 days. Finally, he computed an average cost per hospital admission (comprised of the sum of physicians' fees plus the hospital bill for each admission). This average cost varied from $629 to $1,067 per physician (26).

These studies indicate that substantial variation exists among individual physicians in their use of various types of medical care resources. The findings are consistent regardless of the measure derived. The variation is large even in those few studies which have attempted to control for or deal with the effects of morbidity and patient characteristics.

Almost all the research has involved only individual components of care. Limiting the analysis to only one component of care can lead to difficulties in interpreting any differences in physicians' use of ambulatory medical care resources. Some physicians might use one component of care as a substitute for another or to complement another. Whether individual physicians are consistent in the way they use individual components of care is not clear. The limited amount of data available suggests that the use of various components of care may be complementary; that is, if you use more of one, you use more of all of them. For example, Shroeder et al. found a correlation of r=.44 between laboratory and drug cost per physician and correlations between frequency of office visits and laboratory procedures, r=.55, and drugs, r=.38 and combined costs r=.52 (37). Morrison and Riley found a rank correlation coefficient of .92 between laboratory use and use of prescriptions for outpatient care (29).

The relationship between the use of outpatient care and inpatient care by individual physicians also needs to be examined. Are the highest users of outpatient medical care resources the highest users of inpatient medical care resources or do the higher outpatient resource users use fewer hospital resources, i.e., do they substitute outpatient care for inpatient services?

Another important question is whether the use of the service was primarily physician- or patient-initiated? If the patient can initiate or substantially influence the use of the services, the differences that might be observed in physician use of resources can be confused. Without specific knowledge, office visits after an initial visit for a morbidity appear to be the most difficult to ascertain as to whether the visit was patient- or physician-directed.

Lyle attempted to address this issue of who initiated the care in his study of eight internists (26). He found that the shares of total office visits that were patient-initiated (new problems and new patient visits) and physician-initiated (summary and follow-up visits) varied substantially among individual physicians. Johnson et al. examined prescribing rates of individual physicians in four specialties by prescriptions (new and refill) per office visit (initial and follow-up) and by new prescriptions per initial office visit for a morbidity (23). They found that the rates were highly correlated among specialties but the variation among individual physicians was greater for new prescriptions per initial office visit. These limited data suggest that patient influence needs to be considered when examining individual physicians' use of ambulatory medical care resources.

The variations observed among physicians' use of medical care services raise a third important question. How does the quantity of services used relate to the quality of care received? Are quantity and quality positively related, inversely related, or not related at all? The current view appears to be that more care is likely to be worse care, although the little evidence available does not support this assertion. Daniels and Schroeder (5) and Schroeder et al. (38) showed no relationship between frequency of laboratory procedures and quality of care, clinical productivity, and outcomes of care among individual internists in a university clinic treating a homogenous group of patients. If these findings are substantiated, the implications for costs are obvious. If there are no significant differences in the quality of care even if the quantity varies, then ways to encourage more efficient resource use by physicians becomes imperative. The effectiveness of policies and mechanisms to influence medical care resource use patterns, however, depends upon understanding the factors which influence physicians' resource use.

Factors Related to Resource Use--A major problem in research on physician utilization behavior has been the lack of an underlying conceptual framework to explain such behavior. Often, there is no information or rationale about why certain explanatory variables were chosen. Empirical findings generally have not been linked or related conceptually so there has been little cumulative knowledge. Such knowledge is a necessary condition to formulate effective policy or to develop more efficient delivery of medical care.

The research effort by Pineault did attempt to establish a more systematic approach for understanding physician utilizaton behavior (34). Pineault posited that physicians' medical care utilization behavior is a function of both their socialization and their work environment (33). He states:

> Determinants of physicians' occupational behavior have generally been conceptualized either by reference to the process of socialization they go through during their period of training or by reference to the work environment in which the practice of medicine takes place. The former perspective emphasizes the importance of training and socializing experiences bearing on conformity to occupational norms in shaping the professional personality of the prospective physician. This approach to examining physician behavior is consistent with the view of a professional as an occupational group of people finding identity in sharing values and skills absorbed during a course of intensive training through which they all passed. In this perspective, the medical school and the hospital of residency are conceived as institutions within the medical profession.

He further states:

> The second perspective emphasizes the structural determinants in social organization. According to this approach, formal education establishes qualifications for work, but it does not explain enough of the actual behavior of individuals at work to be satisfactory in itself. Every work setting contains its own special source of influence over the work of individual professionals.

Pineault goes on to say:

> While the regulation of professional behavior in these settings essentially rests upon the internalization of occupational norms, the organization has demands and rules of its own to which physicians conform for utilitarian reasons. A certain degree of bureaucratization thus appears to be instrumental in performing the specialized work of medicine. In sum, while the attributes of a profession do not completely transcend the structural forces of the organization, neither are these attributes completely moulded and modified by the organizational setting in which professional work takes place.... The social organization of medical practice consists of occupational members specially trained for the performance of therapeutic and diagnostic procedures. However, in the performance of these acts physicians are located within organizations that have requirements and demands on their own on the performance of their members.

This general framework is used in the subsequent literature review which deals with factors influencing physicians' utilization behavior. The first section focuses on the professional training and background of physicians and the second focuses on characteristics of the practice setting including work-related factors.

Training, education, and years of experience have been the most frequently examined professional characteristics. A number of studies have shown that physician specialty training is a significant factor affecting physicians' use of a variety of outpatient medical care resources (2,3,8,13,22,23,41). Resources examined have included drugs, radiology, and the laboratory. The differences in the quantities or rates of resource use between specialties have been found to be primarily the result of varying case mixes across specialties.

A number of studies have attempted to determine if the medical school from which physicians graduate affects the way they use medical care resources (9,24,32,37). The findings have been ambiguous. Pineault reported that internists trained in medical schools with a "scientific medical orientation" use fewer medical care resources in conditions of diagnostic certainty and more in conditions of diagnostic uncertainty (32).

Eisenberg and Nicklin (8) reported that, when case mix and specialty were controlled, physicians who were foreign medical school graduates ordered more radiology procedures than domestic graduates and that graduates from public medical schools ordered more laboratory tests than graduates of private medical schools. Freeborn et al. (9) and Rose and Abel-Smith (36) found the region of the country in which the physicians were trained appeared to influence the way they used laboratory resources.

The effects of board certification upon physicians' use of resources have been mixed, with Rose and Abel-Smith (36) finding a post-graduate diploma and Lee et al. (24) finding higher educational qualifications in England to be associated with less laboratory use and less prescribing respectively.

Eisenberg and Nicklin (8) reported that being educated in either a school of medicine or a school of osteopathy did not affect the way physicians used diagnostic procedures.

A few studies have sought to determine the effect of the length of clinical experience upon the quantity of medical care resources used by physicians (3,8,9,32,36). Studies using the number of years since graduation from medical school show an inverse relationship with the use of various types of medical care resources by individual physicians. Pineault found this relationship among internists treating conditions with diagnostic uncertainty (32).

Age can serve as a surrogate for the length of clinical experience, although age can also be a surrogate for a number of other age-related factors. Most of the studies using age show an inverse relationship with the use of medical care resources, primarily diagnostic and other than drug treatment (3,9,32,37). The effect of physician age upon the frequency of drug treatment has not been consistent among the limited research examining this factor (18,19,30,34). A recent study by Hartzema and Christensen examined nonmedical factors associated with prescribing volume among family practitioners in an HMO. Their conclusions were that "within this setting most of the differences in prescribing volumes generated by family practitioners are explainable in terms of the size and age characteristics of the physician's panel, as well as by the volume and frequency of patient contacts" (17).

At least two hypotheses have been advanced to account for the finding that resource use decreases as age of the physician increases. Technology did not play the major role in the past that it does today, and older physicians may simply not have had the exposure or become as reliant on technology as have the younger physicians. Another alternative is that older physicians have gained clinical experience as a result of their years of practice and may not need to rely on diagnostic testing to evaluate their patient's needs (16). Hertzen and Christensen suggest that age and years of experience of the doctor may not be significant once the physician's caseload characteristics have been controlled for; that is, physician's age may be a proxy for size and age of the physician's caseload (17).

Another factor which may influence physician utilization behavior is financial incentives. Schroeder and Showstack have shown that there can be substantial financial rewards to physicians from their use of medical care resources (39).

Among the professional characteristics studied, specialty training is a major factor influencing physicians' use of resources. It also appears that a combination of age of physician and years of clinical experience may have some influence on the way a physician uses medical care resources. While the findings of the effects of age and length of clinical experience are largely consistent, these two characteristics are directly related and none of the studies has attempted to take this relationship into account. Age and size of the physician's panel of patients also affect physician resource use.

The medical school attended also appears to influence the way physicians use resources but the reasons for the effect are not clear. While other professional characteristics of physicians have been investigated (e.g., board certification, type of medical education, country of medical education), the findings from these studies have not been consistent or have been unique to one study.

The work setting and the workers themselves often play key roles in determining production standards and how the work gets done. Friedson discusses this issue in the context of group medical practice (11); he points out:

> In industry, sociologists have documented over and over again the fact that workers are an active force in determining the character of production. They assess production norms in the light of their own conceptions of a fair day's work; they develop and seek to preserve their own methods of doing their work irrespective of the dictates of their supervisors and those who design their jobs "scientifically"; and they are often able to develop common or collective modes of managing their work which deviate from managerial expectations and to maintain them by informal but powerful processes of direct social control. The direct social control processes operating among workers can operate separately and independently of those set up by organizational officials and can even sabotage production itself. Do such processes exist among physicians doctoring together in a medical group, and do they operate with the same effect?

Friedson suggests that different types of medical arrangements do affect physicians' behavior, particularly doctor/patient relationships. In fee-for-service, physicians are likely to be more client oriented and more subject to influence from patients. In group practice, physicians tend to be oriented to colleagues and are more subject to peer pressure, according to Friedson (10).

Friedson also suggests that patients in prepaid group practice may be more demanding than in traditional practice because they feel they are fully covered and have a contractual right to care. Prepaid group practice (PGP)physicians, on the other hand, may have heavy workloads and perceive patients' problems as trivial or that patients demand unnecessary treatment or services. To manage their workloads, physicians may order laboratory or radiology procedures. These tests do not add to costs in physician time and are relatively inexpensive, compared to hospital care and drugs (drugs often are not covered in PGP).

Friedson did not directly test the relationship between type of medical care organization and utilization of medical care services by physicians. However, it would seem likely that the more highly organized settings have more formal and informal controls which lead to different and perhaps less varied patterns of utilization among physicians.

On the other hand, Darsky (6) indicates:

> Against the accumulation, over the decades, of information about the structure of private medical practice and the parameters of care associated with that structure, there is available for comparison only a few studies on the structure of group practice and only sparse data on parameters of care from group practices. To the present time, the two areas of study have proceeded independently of each other; no study has investigated group structure and medical care outcomes in the same group. Parameters on hospital admissions and data on administrative controls in group practices are cases in point. As is well known, lower hospital admission rates are consistently reported by group practices as compared with private, community practices, but the data are reported wholly as parameters, unrelated to the structural properties of groups or to processes within the group which presumably account for the parameters. As a result, efforts to explain differences involve argument rather than analysis. The few studies describing the form and operation of administrative controls on practice in groups usefully delineate similarities and differences with private practice, but deal with medical care consequences by implication, not by (research) design.

Although it seems likely that the work setting may influence physicians' utilization behavior, empirical evidence to support or reject this assumption is difficult to find (25). Nevertheless, this appears to be a useful framework and studies are reviewed which to some degree bear on the potential influence of the practice setting on physicians' utilization behavior. The type of medical care organization and work-related factors are emphasized in the subsequent discussion.

Mechanic found little difference in the use of diagnostic procedures by general practitioners and pediatricians in prepaid group practices and in non-prepaid solo practices (28). Eisenberg and Nicklin reported no difference in the use of diagnostic procedures among physicians in solo and group practices (8). Rose and Abel-Smith did report that physicians in group practice in England used more laboratory tests (36).

These few findings suggest that the use of diagnostic procedures by physicians in group practice may be no different from that of physicians in solo practice. It must be noted, however, that these studies made no attempt to control for professional characteristics of the physicians, the case mixes of the groups, or other patient characteristics which could affect use.

Pineault identified some general conditions under which physicians are likely to become responsive to organizational rules and regulations and attempted to determine if such conditions affected their use of medical care resources. He investigated whether or not holding an administrative position and the length of time in a prepaid group practice (HMO) setting influenced internists' use of medical care resources (33). He found that internists who had occupied an administrative position and who had been in the group practice longer tended to use slightly more clinical resources (e.g., office visits, telephone calls) and fewer technical resources (laboratory, radiology) in their practices than other physicians (33). In the same setting, Freeborn et al. found that internists' rate of laboratory use was positively correlated with their clinic chief's rate of laboratory use (9).

These findings suggest that individual or physician group's use of medical care resources may be affected by the physician's length of service and position in the group's authority structure as well as by influential physicians.

There are also a few studies on the effect of work-related factors upon physician resource use. Freeborn et al. reported that the number of patients seen per day (workload) did not appear to significantly influence internists' use of laboratory procedures (9). Hemminki found that physicians with longer working days tended to prescribe more psychotrophic drugs (20). Dunnell and Cartwright reported that English physicians with fewer patients (shorter lists) tended to provide more prescriptions per patient (7).

Pineault found that internists with smaller case loads tended to use more clinical resources (office visits, telephone calls) and fewer technical resources (laboratory and radiology procedures) (33). However, if physician workload (total number of patients) was larger, they tended to use more technical resources and fewer clinical resources.

The findings suggest that such non-medical factors as workload, caseload, and office hours may influence the way individual physicians use outpatient medical care resources and that these factors may influence individual physician's use of different components of care. Since these factors may vary by type of setting (e.g., fee-for-service versus prepaid group practice), this characteristic also needs to be taken into account.

This review of the literature has shown that there is substantial variation among physicians in their use of medical care resources. These studies have been few in number, have not all examined the same types of resource use, and have not measured resource use in the same way. Most have involved limited numbers of physicians, mostly internists, and they have been done in a variety of settings. Most have not attempted to control for the effects of case mix variation among physicians.

Much more needs to be learned about differences in individual physician's use of medical care resources in similar settings and across different settings as well as among different specialties. Variation in physicians' aggregate use of ambulatory medical care resources should also be studied. Finally, the correlation in physicians' resource use rates across the different components of outpatient medical care also needs examination.

Studies of the effects of the professional characteristics of physicians and practice setting characteristics have shown that specialty, the number of years in practice, and site of medical education appear to affect the way physicians use ambulatory medical care resources. While it has been assumed that the way medical practices are organized (including the method of reimbursing physicians) should influence the way they use outpatient medical care resources, there is no compelling research data to support the assumptions. Caseloads and workloads of physicians have also been assumed to influence the way physicians use medical care resources (particularly the more technical types of resources, i.e., laboratory, radiology, and drugs). However, research results have been inconsistent and few.

While the above perspective appears to be useful, more systematic and comparative research needs to be done which tests the effects of the organization of practice, method of physician reimbursement, and other organizationally related characteristics upon physician utilization behavior when physician and patient characteristics are controlled. There is also the question of whether physicians' characteristics or practice setting may be more important in accounting for physicians' behavior. Are physicians' practice patterns well formed by the time they enter practice or does the practice setting modify their practice patterns?

Specific Study Objectives

One objective of this study was to determine the extent of variation in ambulatory care resource use among individual physicians within the specialties of internal medicine, pediatrics, and obstetrics-gynecology.

The components of resource use examined included outpatient laboratory and radiology procedures, other diagnostic procedures assigned as medical office procedures, outpatient drug orders, outpatient surgical procedures, and hospital admissions. A dollar rate of aggregate ambulatory medical care resource use (not including hospital admissions) was developed for each physician in each specialty. The rates were adjusted for patient age and morbidity groupings to control for the effect of varying casemixes among the physicians. Office visits and telephone calls were excluded because use of these services can be influenced by patients.

A second objective was to determine physician characteristics related to differences in use of ambulatory medical care resources. Accordingly, the relationship between resource use by physicians and the following types of factors were examined:

A. Professional Factors

- Medical training and professional activities
- Practice setting and experience prior to KPMCP

B. Style of Practice and Attitudes

- Risk-taking orientation
- Orientation to the social role of medicine
- Attitudes toward resource use

C. Practice Setting Variables

- Length of time in KPMCP
- Formal authority
- Informal influence
- Commitment and loyalty to KPMCP

D. Work-related Factors

- Caseload
- Workload
- Satisfaction with size and manageability of workload

DESIGN

Research Setting and Data Sources

The Kaiser-Permanente Medical Care Program (KPMCP) is a prepaid group practice health maintenance organization composed of three entities: Kaiser Foundation Health Plan, Kaiser Foundation Hospitals, and Northwest Permanente, P.C., Physicians and Surgeons. The Kaiser Foundation Health Plan contracts with the Northwest Permanente, P.C., Physicians and Surgeons, to provide medical care and with the Kaiser Foundation Hospitals to provide hospital care.

KPMCP enrolls approximately 260,000 members, or about 20 percent of the population of the Portland, Oregon and Vancouver, Washington metropolitan area. The demographic and socioeconomic characteristics of the members of the KPMCP correspond very closely to the metropolitan population as a whole. Most services are covered by prepayment although there is a small copayment per office visit for the majority of groups covered by the plan. Some groups and those with individual coverage may copay one-half of laboratory and radiology costs. One-half of the membership has a prepaid prescription drug benefit with varying levels of copayment.

Northwest Permanente, P.C. (NWPPC), in Portland, Oregon, is an independent professional corporation of board-certified or board-eligible physicians. These physicians, who practice full-time in all the major specialties of medicine and surgery, make up the active staffs of the two KPMCP hospitals. Subspecialty services are provided by departments of radiology, pathology, and physical medicine.

KPMCP members are expected to choose a physician from the medical group to be their regular doctor. Internists and pediatricians provide primary care to adults and children and are responsible for maintaining continuity of treatment, including care for their patients while they are hospitalized. The focal point for medical care is the physician's office where most patients are seen by appointment, although provisions are made for seeing walk-in patients. Emergency services are available at all hours, and house calls are provided for patients when medically indicated. The program has two hospitals and ten ambulatory care facilities which are dispersed geographically around the metropolitan area. Members may use any of the ambulatory care facilities.

Five sources of data were used: (1) The Physician Survey, (2) the Physician Demographic and Professional Background File, (3) the Physician Availability File, (4) the Outpatient Information System, and (5) the KPMCP Membership Information System and the HSRC Calendar File.

The Physician Survey--A survey of physician members of NWPPC was undertaken in 1976-1977 by investigators from the Health Services Research Center. The survey utilized a structured self-administered questionnaire, and all full-time physicians in the KPMCP were requested to participate. The survey required approximately three to four hours to complete. Meetings were held with the medical group management and each of the major departments to explain the study and to answer any questions. Questionnaires were distributed at department meetings and to individual physicians. Routine follow-up by telephone and by personal visits were made to encourage participation. The questionnaire was originally pretested at other KPMCP sites in San Francisco and in Cleveland.

Because of the scope of the survey, it was completed in two parts. Of the 179 physicians eligible to participate in the survey, approximately 79 percent completed Part I and 69 percent completed Part II. Background and professional data on respondents and non-respondents are attached (see Appendix I). In general, respondents were somewhat younger than non-respondents and surgeons were less likely to have responded than physicians from other specialties. Most internists (69 percent), pediatricians (78 percent), and obstetrician/gynecologists (94 percent) participated in the survey. Approximately 69 percent of the surgeons responded. There were no significant differences between respondents and non-respondents on sex, place of medical school training (foreign versus U.S.), board certification, or AMA membership.

Physician Demographic and Professional Background File--This file contains background information on all the physicians who were eligible to participate in the survey and includes items that were not included in the survey (e.g., residency training, board certification). The data were obtained from the KPMCP administrative records and from the AMA directory. This data permitted comparison of survey respondents with non-respondents on basic demographic and professional characteristics, and the comparisons described above used data from this source.

The Physician Availability File--This data source includes the total number of visits (outpatient encounters) for each KPMCP physician. It also includes the time that the physician is available to see patients. The data are derived from the appointment registers maintained in each clinic. Each encounter with a KPMCP provider is recorded on these registers and the encounters are subsequently computerized. The measures of physician workload used in this study were derived from this source.

The Outpatient Information System--The Outpatient Information System was designed and developed to record the outpatient utilization experience of a five percent random sample of KPMCP subscriber units. The five percent sample was drawn in September 1966 from the list of subscriber units (families) belonging to the KPMCP at that time. A series of random numbers were used to select units for inclusion in the sample. Each month since, five percent of all newly enrolled families have been added to the initial sample. This open-ended sample is designed to represent the overall KPMCP membership at any point in time.

This data system includes every encounter of sample members with the KPMCP. Each encounter with the medical care system generates a unique morbidity record. The characteristics of the contact and the provider of service are routinely identified. For each contact, a variable number of morbidities from one through nine may be recorded. The morbidity that is judged to be the primary reason for the contact is identified as the presenting morbidity. Any other morbidities for the contact are identified as associated morbidities. The morbidity is the basic unit of analysis within the system and has attached to it the specific clinical, laboratory, and radiological services, and drug orders provided as well as hospital admissions and scheduled follow-up services.

All laboratory, radiology, medical, and surgical procedures have been assigned a code and a unit value that reflects or was derived from the 1964 California Relative Value Studies (1). A unit value for drug orders was established to reflect their value relative to laboratory, radiology, and other procedures and relative to the different types of drugs ordered (see Appendix II).

KPMCP Membership Information System and the HSRC Calendar File—The Membership Information System and the Calendar File record the following information for each individual:

- o Medical record chart number
- o Health Plan I.D. number consisting of a subscriber or family number plus an individual number
- o Patient name
- o Sex
- o Date of birth
- o Health Plan effective date
- o Effective date of current eligibility and, where applicable, termination date of eligibility and reason for termination
- o Class code or type of coverage
- o Group number or employer
- o Zip code.

The Calendar File System interfaces on a monthly cycle with the Membership Information System to record changes for any individual included in a research study. When changes in eligibility characteristics are identified, the previous record of characteristics is closed with the previous month's date and a record of the new characteristics opened with the current date. Structured as a "FROM DATE TO DATE" description of eligibility, the Calendar File provides a detailed monthly eligibility history of every individual included in a research population.

The five percent random sample of subscriber units which serves as the population base for the Outpatient Information System has been maintained as part of the Calendar File.

Study Population

The physicians comprising the study population are a subset of those who were eligible to participate in the 1976-1977 Physician Survey (n=179). The study population consists of physicians whose primary specialty was internal medicine (n=52), physicians whose primary specialty was pediatrics (n=27), and physicians whose primary specialties were obstetrics or gynecology (n=18). Physicians in these three specialties provided approximately 75 percent of all outpatient physician office visits in the KPMCP during 1977.

Thirty-six of the internists responded to the survey and 16 did not, a response rate of 69 percent. Twenty-two pediatricians responded and five did not (response rate = 82 percent). Seventeen of 18 obstetric/gynecology physicians responded (response rate = 94 percent). Thus, the study group included 36 internists, 22 pediatricians, and 17 obstetrician-gynecologists.

This group was further restricted to physicians in these specialties whose caseloads consisted mainly of primary care. If a physician's practice or caseload included a high proportion of visits for subspecialty care (50 percent or more visits), she/he was removed from the study group. Six physicians were removed from general medicine, two from pediatrics, and none from obstetrics/gynecology.

After applying these criteria, the final study group included 30 physicians in internal medicine, 20 physicians in pediatrics and 17 physicians in obstetrics/gynecology.

To conduct the analyses, data were linked from the several data sources: Physician Demographic Background File, Physician Survey, Physician Availability File, and the Outpatient Information System. An analysis file was constructed which facilitated the application of basic computerized statistical analytical packages (e.g., SPSS, SCSS, BIOMED).

The measures of physician resource use included in the analysis file were derived from the Outpatient Information System and consisted of the medical care utilization of the five percent sample members that was provided by each study physician during the years 1976-1978. To assess the extent to which physicians were at risk of using resources, it was necessary to identify the number of months and specific dates that each physician was in practice from January 1976 through December 1978. A unique identification number was assigned to each physician and this information was added to each of the basic data sources. A single record was generated for each physician that included data from each of the sources.

While generalizing from the five percent sample of subscriber units to the KPMCP membership is appropriate, applying observations derived from this sample of subscriber units to physicians may introduce methodological problems. Bias in estimated physician resource use rates may result from sampling subscriber units rather than physician contacts. Since the allocation of patients in the five percent sample to individual physicians may not be a random process, the probability of a unit of care or service being attributed to individual physicians is not known and is not equal across patients. This probability partly depends on the number of members and/or patients from the five percent sample in each physician's caseload. Since this probability is not known, the magnitude of any possible bias cannot be determined.

Although this is a study of individual physicians, it is not a five percent sample of physician practices. It consists of physician practices observed among a five percent sample of subscribing units. While the sampling procedure cannot be changed, its potential effects can be assessed. To assess these effects, the total number of direct contacts with a particular physician (as determined from the Physician Availability File) was compared with the estimated total number of such contacts (20 x number of contacts in the five percent sample). The estimated total and actual total were highly correlated ($r > .85$) within each specialty, suggesting that little or no distortion was present (see Table 1 and Appendix III; Appendix III includes a discussion of the sampling procedures.)

Measures

Resource Use—The primary dependent variable was a dollar rate of physician-directed ambulatory medical care resource use for each physician in each specialty for the three-year period 1976-1978. The resource use rates were developed by first identifying all laboratory and radiology procedures, all other diagnostic procedures classified as office procedures,* all outpatient surgical procedures,** all drug orders at first contact for a morbidity, and all hospital admissions provided by each physician as a result of a direct (face-to-face) contact with a member of the five percent sample during the three-year period. These outpatient procedures were selected because they are thought to best represent physician-directed ambulatory medical care resource use. Physician office visits of all types and immunizations as a medical procedure were not included. There can be a substantial patient influence upon the use of these resources.

The relative values assigned to these procedures (with the exception of hospital admissions) were summed by type and by year and then converted into 1977 dollars (31). The total dollar value for all the components and all the years for each physician became the numerator for calculating the total rate for each physician.

The denominator was the total number of direct morbidity contacts by members of the five percent sample with each physician during the three-year period. Telephone and letter contacts with the physician were not included. Thus, the total resource use rate per physician was the dollar value of physician-directed ambulatory medical care per direct morbidity contact with the physician over the three-year period.

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*The medical diagnostic category included diagnostic procedures, other than lab and x-ray, which are done in the physician's office (outpatient). These procedures have a unique procedure number in the HSRC's modified RVS system. Common examples are ECGs, EEGs, spirometry, and allergy skin testing.

**Surgical procedures included any surgical procedure performed in the outpatient setting by a physician. Such procedures also have been given a unique procedure number in the HSRC's modified RVS System. Common examples are biopsies, incisions to drain cysts, excisions of skin lesions, and other minor surgical procedures. This resource category is not shown separately in the tables of this report because the number of procedures were so small. They are, however, reflected in the total or aggregate resource use dollar measure.

Other physician resource use rates essential for the analyses were calculated from the data used to create the primary dependent variable. These included annual total dollar rates, annual and aggregate dollar rates for laboratory procedures, radiology procedures, drug orders, surgical procedures, and other diagnostic procedures. In addition, annual and an aggregate rate per physician of hospital admissions per direct contact were calculated. Excluded were hospital admissions for the birth of a child.

To make valid comparisons among physicians' resource use rates, it was necessary to adjust for differences in their case mixes. Comparisons of patient age and diagnostic categories among physicians within specialty showed that there were significant differences in these indicators of case mix. The distributions of males and females, i.e., sex of patients, were not significantly different among physicians' caseloads. Appendix IV shows the age and disease categories that were used in the standardization procedure. The disease categories were based on the ten category behavioral disease classification scheme developed by Hurtado and Greenlick (21).

Introduction of the following notation facilitates explanation of the standardization procedure used in this study.

DR = department (specialty) specific resource use rate for the i age morbidity group; $i = 1, 2, \text{--} I$

CR = crude resource use rate for a given physician

$P_1, P_2, \text{--} P_I$ = the proportions of the physicians' morbidity contacts in each of the age-morbidity groups.

CDR = crude resource use rate for the department.

The first calculation in indirect standardization is of the overall rate that would obtain if the departmental age-morbidity specific rates were applied to the physician under consideration. It is

$$CR^1 = \sum_{i=1}^{I} DR_i \cdot P_i \quad .$$

The indirect adjusted rate for this physician is then

$$IAR = CDR \cdot \frac{CR}{CR'} \quad ,$$

that is the crude departmental rate (CDR) multiplied by the ratio of the actual crude rate for the physician (CR), to the crude rate for the physician which would exist if the given physician were subject to the department's schedule of age-morbidity groups specific rates (CR'). Since the sampling variation in CDR and CR' are much smaller than the variation in CR, the standard error of IAR is approximated by

$$SE(IAR) \doteq \frac{CDR}{CR}, \sqrt{\sigma^2 \; (CR)} \quad ,$$

where the variance (σ^2) of CR is estimated from the expansion given in Appendix III.

Independent Variables-Factors Related to Resource Use—The variables were organized into four general categories: (1) Professional Background and Activities, (2) Style of Practice and Attitudes toward Resource Use, (3) Practice Setting, and (4) Work-Related Factors. The specific variables used are outlined below. Detailed definitions are in Appendix V.

Professional Background, Experience and Activities

- Age and years since graduation
- Medical school (public, private)
- Medical school prestige/reputation
- Residency training (medical center, university affiliated/community hospital)
- Subspecialty practice (percent of caseload)
- Number of seminars/courses attended in past 5 years
- Medical school teaching (yes, no)
- Scientific papers published/presented
- Prior experience (right out of residency, other prior KPMCP experience)

Most of the above factors have been used in prior studies. They are included here in order to determine their effects in this setting as well as to ascertain the consistency of the findings with previous research.

Style of Practice

- Risk-taking orientation
- Orientation to social role of medicine

The term "style of practice" is intended to describe qualities or characteristics of practitioners which affect the way medicine is practiced as a consequence of personality and cognitive predispositions (14). Two elements of "style" were investigated: (1) style regarding risk taking in diagnosis and treatment; and (2) style regarding the physician's orientation to the social role of medicine.

Physicians differ on such dimensions as willingness to assume risk in diagnosis and treatment. A major modality of the clinical process to be distinguished, therefore, is the distinction between physicians who are risk takers and those who are risk avoiders. This represents an attempt to characterize a quality in the physician's perception of the clinical process when presented with a "case" according to which the probabilistic elements in diagnosis and treatment are mentally organized. This element of style is likely to be related to personality, but is not identical with it. Similarly, physicians' training in certain "schools" of medical practice may be a related but analytically distinct aspect of style.

The assumption to be tested is that risk takers are less likely than risk avoiders to depend on diagnostic aids and technical resources. Physicians characterized as risk takers would be expected to rely more on clinical judgment and would tend to use fewer laboratory tests and x-rays. On the other hand, they would be more likely to order drugs.

This concept is operationalized by defining risk takers as those who would not treat with antibiotics in the absence of culture results and/or who define themselves as less clinically cautious or conservative in practice. These measures were derived from items (questions) included in The Physician Survey.

A second modality of practice relates to the perceived narrowness or breadth of the medical function. This dimension incorporates the distinction between practices oriented to the "whole person" and those oriented to more traditional, clinically limited goals. A "science-humanistic" orientation carries something of the same distinction. A broad view of the role of medicine likely results in a greater different use of resources. A "social orientation" involves the extension of practice into community and personal health affairs not directly connected with the diagnosis and treatment of illness such as: family planning (contraceptive prescribing, etc.), obesity control, control of vague and undefined disturbances, sexual problems of vague origins, and concern with intra- and interpersonal problems. In general, the more socially oriented physicians would be expected to rely less on medical care and the medical model of care. Therefore, their use of these medical care resources would likely be less than the resource use of physicians oriented more to the technical aspects of medicine.

Closely related to the concept of social orientation is the way in which physicians view patients and their reasons for seeking care. If patients are viewed as presenting for trivial reasons or minor symptoms, physicians may reflect these views in their treatment patterns. As research has shown, the attribution of triviality to patients' symptoms and complaints has been found to be related to physicians' social orientations as well as to the form of medical care organization (27).

Attitudes Toward Resource Use/Effect of Patient's Coverage

These measures were derived from questions in the survey such as:

- Does patient's level of coverage influence resource use?
- Are physicians too dependent on diagnostic aids/consultations?
- Could use of tests be reduced?

Physicians' perceptions regarding the patient's level of coverage could influence physicians' use of resources. If physicians are aware that patients have less than full coverage for laboratory and radiology, for example, they may not order such tests or be more careful about ordering them. Most groups in this HMO have full coverage for laboratory and radiology but some groups only have benefits which pay for one-half of laboratory and radiology. Physicians' general attitudes toward use of medical care resources have also been found to vary and such attitudes could affect decision-making by physicians. Physicians' responses to questions regarding whether physicians are becoming too dependent on diagnostic aids/consultations and whether use of tests could be reduced were used to measure physician attitudes toward resource use. One would expect that physicians who felt that tests could be reduced and who indicated physicians were becoming too dependent would use fewer total resources. This study provided the opportunity to determine the relationship between physicians' attitudes toward resource use and their actual behavior as measured by utilization.

Practice Setting Variables

This study took place in a setting which is assumed to generate organizational and financial incentives for physicians which result in appropriate care and careful use of resources (33). The extent to which individual physicians respond to these incentives and controls can vary, however, by a number of characteristics. Knowledge and awareness of group practice norms may differ based on the physician's tenure, commitment, level of participation, and the like. In this study, three general conditions were assumed to be important for the physician to respond to the requirements and demands of the medical care system and medical group: (1) length of time in the Group, (2) whether the physician has occupied an administrative position in the medical group, i.e., formal authority, and (3) the physician's location in the informal influence structure. Physicians with greater length of time in the groups and those with formal authority might be expected to use fewer resources, in keeping with the group practice norms of efficiency (33). Physicians with informal influence may or may not exhibit practice patterns congruent with official expectations. To the extent that the behavior and expectations of formal and informal leaders are congruent, one might expect even more similar practice patterns among the physicians.

- Length of time in Medical Group, i.e., years with KPMCP
- Authority, i.e., held formal office as chief of service, professional director, member of executive committee of medical group

Several sociometric questions were included in the survey to tap informal influence and leadership. Physicians were asked to indicate those physicians who were the most influential overall in terms of running the group and in terms of overall leadership.

They were also asked to choose and to indicate physicians in the group who were most respected for their technical competency, i.e., the technical influentials. Conceptually, these are viewed as two basic dimensions of influence/leadership. The number of choices received by physicians for influence in each area were summed and those chosen most frequently were considered to have greater influence.

- Most technically competent
- Overall leadership/influence

The last issue deals with the relationships between commitment to KPMCP and to the medical group and resource use patterns. Physicians with higher levels of commitment to this form of practice might be expected to be aware of and to reflect in their behavior norms related to efficiency. They would more likely be lower resource users. Responses to questions used to measure commitment included:

- Loyalty to Oregon KPMCP
- Loyalty to Oregon medical group
- Choose K-P, medical group again, if given the choice

Work-Related Factors

- Caseload (number of different patients seen)
- Total number of patients seen over a period of time
- Percent of physician's patients where he/she is the regular doctor

Certain work-related factors may be associated with variation in resource use by the physicians. These include: (1) the allocation of patients as reflected in the caseload of individual physicians, (2) the division of the total workload of the group among physicians, and (3) the percentage of the physician's patients where he/she is the regular doctor.

Caseload is expressed by the number of different patients seen over a period of time. Caseload may influence use of resources in various ways. Having a limited number of patients can enable a physician to investigate more thoroughly. This situation can result in a high use of resources. On the other hand, a physician may know the conditions of his patients better if he/she has only a few patients. This permits the physician to assess the condition of the patient clinically and thus to be more conservative in the application of medical care procedures and tests. Thus, use of medical care resources might be lower.

Workload refers to the number of patients seen over a period of time. As workload increases, physicians may tend to increase their use of resources such as laboratory and drugs in order to manage their patient queues and to rationalize demand. They may not feel they have enough time to do a careful and thorough examination because of time pressures and so they may order laboratory work or consultations to allow more time to think about and to analyze the patient's problem. Some have suggested that this is a problem common to systems where the financial constraints for using service have been removed and where physicians are paid by salary or by capitation (28).

Another work-related factor which could influence resource use is the proportion of the physician's patient load where he/she is the regular doctor. Although KPMCP members are expected to choose a regular doctor, this does not always happen. Older members and those who have been members for a long time are more likely to have a regular doctor. Physicians new to the group, as well as new patients, may not have had the time to establish ongoing links. Younger patients may not need a regular doctor because of their infrequent use of the system. At any rate, some physicians end up with patients they have not seen before and the proportion of a physician's patients who consider him/her their regular doctor may vary. If a physician's patient load consists disproportionately of new patients, he/she may order more tests and use more resources to establish baseline date or to define the patient's problems more definitively.

Finally, the physician's perceptions and satisfaction with the size and manageability of his/her workload also may affect resource use. Dissatisfied physicians would be expected, for example, to use more resources than satisfied physicians.

- Satisfaction with stability of patient/physician relationships
- Satisfaction with size, manageability of patient load

Analysis Techniques

The frequency distribution of each independent variable was examined to determine whether there was sufficient variation among physicians to include the variables in subsequent analyses. Frequency distributions of each of the physician resource use rates were computed to describe the extent of variation among physicians.

The next step was to determine the relationship between physicians' resource use rates over time to assess whether it would be appropriate to base subsequent analyses on the aggregate of the three years. The intercorrelations among the components of resource use were also examined both for methodological reasons and for substantive interest. The statistical technique used was simple (zero order) bivariate (Pearsonian) correlation. The relationship between resource use rates and interval-scale independent variables was assessed using correlation coefficients. In addition, these interval-scale variables were categorized into two groups and t-tests of the group means were performed. For categorical data, only t-tests of differences between means were done after collapsing the data into two groups. The sample sizes were not sufficient for analysis of more than two groups.

Multiple regression analyses were for two purposes. First, in order to examine the independent effects of variables which were not significant at the conventional $p \leq .05$, forced entry regressions (using the few variables which were significant or showed a trend in the bivariate analyses) were done for each conceptual category. Variables that were found to have a $p \leq .25$ by the bivariate analyses, were included in forced entry regressions. The regressions were done for each conceptual area and for each resource category. Based on these results, a final set of regressions were done to identify the most important set of factors which affected resource use. Variables that were significant at the $p \leq .10$ from each conceptual area were combined in an overall forced entry regression analysis. In choosing the independent variables for the regressions, it was necessary to deal with the problem of multicolinearity. The intercorrelations among the candidate independent variables were examined, and if a cluster was found to be highly interrelated, a single variable that was judged to best represent the cluster of variables was chosen to include in the final regressions. Since it is recognized that including insignificant variables in a regression may be adding noise which makes it more difficult to detect the more strongly related predictors, step-wise multiple regressions using the conventional $p \leq .05$ level for inclusion were also performed. This made it possible to identify the most strongly related predictors. Weighted regression analyses which take into account the variable precision of physicians' resource use rates were also performed. The variance of physicians' resource use rates were computed from the expression given in Appendix III and each physician data point was weighted by the reciprocal of the variance of the rate. This procedure assigns greater weight to more reliable physician rates and less weight to less reliable physician rates. Stepwise regressions were used for these weighted analyses.

FINDINGS

Resource Use Patterns

A correlational analysis was performed to determine if physicians' dollar rates of total outpatient resource use were consistent over years (1976-1978). As can be seen in Tables 2-4, total dollar rates were significantly correlated over the three years and these findings were similar for all three specialties. Correlation coefficients ranged from 0.47 to 0.77. Physicians tended to be consistent in their levels of total outpatient resource use over the three years.

When the major components of outpatient resource use were examined, i.e., laboratory, radiology and drugs, the same patterns generally persisted, except for radiology (Tables 5-16). Use rates of these resources among physicians were significantly correlated over years and the coefficients were generally high for each specialty. Among internists and pediatricians, resource use rates for drugs and laboratory were highly correlated over the three years and, except for one year, the same pattern was seen with obstetrician/gynecologists.

Physician hospital admission rates were not consistent over the years (Tables 17-19). The correlations were not significant and this finding was similar for physicians in all three specialties.

Another area of interest was whether or not physicians' resource use rates tended to be consistent across resource use categories. For example, did high users in one category tend to be high users of all types and did low users tend to be low users of all resource types? Another possibility is that physicians may substitute one type of resource for another and, thus, use in one category might be inversely related to use in another category. Finally, use of some types of resources may be expected to be complementary such as drugs and laboratory.

Composite dollar rates reflecting all three years were used to examine these assumptions. Pearsonian correlations were calculated for physicians in each specialty and the results are shown in Tables 20-22. Among internists, there was a significant positive relationship between their use rates for laboratory and radiology. This same relationship was found for pediatricians. In addition, pediatricians' laboratory use was significantly and positively correlated with drug use and hospital admissions. Radiology use was also significantly correlated with hospital admissions.

Among obstetrician/gynecologists, the rates for laboratory and diagnostic use were significantly and positively correlated. There were significant negative correlations between laboratory and drug use and between drug use and hospital admissions.

The findings suggest that there are not substitution effects in the way physicians use these resources with the possible exception of obstetrician/gynecologists.

The coefficients of variation in the dollar resource use rates were computed for each study physician. The coefficient of variation is defined as the standard error of the rate divided by the rate. The reader is referred to Appendix III for the derivation of the standard error of physician resource use rates based on random sampling of subscriber units. Table 23 displays summary statistics for the distribution of coefficient of variation (%) over individual physicians. Estimates of resource use rates for all categories except hospital admissions were reasonably precise among internists. For pediatricians, the radiology and hospital rates are less precise. For obstetrician/gynecologists, all the category rates are reasonably precise, except for radiology. The relative variation among physicians (as measured by the coefficient of variation) was not very different across the specialties (Table 24). Internists had the highest mean total ambulatory resource use rate. The rate was similar for internists and obstetrician/gynecologists and substantially lower for pediatricians.*

Laboratory procedures contributed the most to the total dollar rate among the specialties, approximately 50 percent among obstetrics/gynecology and 40 percent among internists and pediatricians. Drug orders made the next largest contribution to the total rate of pediatricians and internists, approximately 32 and 25 percent of their respective total dollar rates. Drug orders amounted to only 14 percent of the total rate for obstetrician/gynecologists. Radiology procedures accounted for 23 percent of the total dollar rate of internists and 18 percent and 11 percent of total rates of pediatricians and obstetrician/gynecologists. Other diagnostic procedures accounted for 11 percent or less of the total rates among the specialties.

In each specialty, there was a wide range of rates for total ambulatory resource use among individual physicians. The range was two-fold for internal medicine and pediatrics and somewhat more than two-fold for obstetrics/gynecology.

The mean adjusted hospital admission rate was much higher for obstetrics/gynecology than the other two specialties even though newborn admissions were excluded. The mean hospital admission rate for pediatrics was the lowest of the three specialties. The relative variation was much greater for pediatrics and internal medicine compared with obstetrics/gynecology.

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*Outpatient surgical procedures are included in the total dollar rate for aggregate outpatient use. Because they make up such a small percentage of the total, they are not shown in the tables discussed in this section.

The ranges in rates also varied considerably among physicians within each specialty for hospital use. There was almost a ten-fold variation among pediatricians, a six-fold variation among internists and a two-fold variation among obstetrician/gynecologists.

In subsequent sections, data are reported on physician characteristics and how these affect the use of outpatient medical care resources. The data were analyzed within each of the three specialties, i.e., internal medicine, pediatrics, and obstetrics/gynecology. Thus, the effects of age group, broad morbidity categories, and specialty are controlled in the analyses. As shown in Table 25, specialty accounts for approximately 60-70 percent of the total variance of the adjusted resource use rate in each outpatient resource category and over 90 percent of the total variation for hospital admissions. Previous work has shown that specialty is important and, therefore, the data were analyzed within each specialty. This study attempts to identify physician characteristics that account for variation in resource use among individual physicians within specialty. The discussion focuses on the main dependent variable, i.e., total outpatient resource use.

Factors Related to Resource Use--Bivariate Analysis*

Professional Background and Activities--Age and years since graduation, and medical school and hospitals attended for residency training were examined to determine the extent to which they influenced total dollar rates of resource use by internists, pediatricians, and obstetrician/gynecologists (Tables 26 - 28).

Older internists' rates of total resource use were slightly lower than younger internists. However, the difference was not statistically significant. The correlation coefficient was also not significant.

Older pediatricians also had lower dollar rates of resource use. The findings are similar for years since graduation. The findings were in the same direction for years since graduation although the differences were not statistically significant. Age and the rate of total resource use were significantly correlated. The Pearsonian correlation coefficient was -0.45 (P=.024).

These factors appeared to have a similar effect among obstetrician/gynecologists in that the older physicians had lower total dollar resource use rates and the longer the time out of medical school, the lower the rate of total resource use. However, the differences were not significant.

Rates of total resource use by internists trained in public medical schools were significantly higher than the rates of internists from private schools. Among pediatricians and obstetrician/gynecologists, there were no significant differences in total resource use rates on the basis of private versus public medical school training (Tables 26 - 28).

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*The bivariate and multivariate tables do not show data on outpatient surgical procedures or other diagnostic procedures assigned as medical office procedures. These procedures are, however, included in the total aggregate dollar rate.

There was no significant relationship between total resource use and whether or not a physician's training was in a residency affiliated primarily with a medical school. This finding was similar for each specialty. In all three specialties, the prestige of the medical school in which physicians were trained also did not significantly relate to total resource use rates (Tables 26 - 28).

The number of courses and seminars attended did not seem to influence the total resource use rate among physicians in the three specialties. Medical school teaching did seem to have some influence on total resource use rates, in that internists and pediatricians involved in teaching had higher total resource use rates. However, these differences were not significant (Table 29).

Scientific orientation as measured by the number of scientific papers published and presented did not relate to the rate of total resource use by internists. Pediatricians who reported publishing and/or presenting scientific papers had somewhat higher total resource use rates than those who did not.

Teaching status did seem to influence the rates of total resource use. Pediatricians involved in teaching had higher rates but the differences were not significant. Pediatricians with a high level of scientific activity also had higher rates of total resource use, but these differences also were not statistically significant (Table 31).

None of the above factors were significantly related to rates of total resource use for obstetrician/gynecologists (Table 33).

As shown in Tables 30 and 32, prior experience seemed to make little difference in terms of total resource use rates for internists and pediatricians. On the other hand, the rates of total resource use were significantly higher for obstetrician/gynecologists just out of residency (Table 34).

Location of practice (free-standing versus hospital-based clinic) seemed unrelated to total resource use. This finding was the same for all three specialties.

In summary, age, years since graduation, medical school training (public/private), and current teaching activities appeared to affect resource use. However, these varied depending on specialty.

Style of Practice--Data on measures of risk-taking orientations and rates of total resource use are shown in Tables 35 - 37. Differences were small and generally not significant for each specialty.

In a few cases, pediatricians classified as risk takers did have lower use rates for some categories of resource use. Pediatricians who indicated they would probably not provide antibacterial treatment for infections had lower total resource use rates and these approached significance.

Among obstetrician/gynecologists, the results were inconsistent or generally not in keeping with the assumptions that risk takers would have lower resource use rates. However, there was one significant result. Those who would not provide antibacterial treatment for suspected tonsilitis had higher total resource use rates.

There was some support for an association between the rate of total resource use and social orientation among internists. The more socially-oriented internists had lower total resource use rates (Table 38). Social orientation seemed to make little difference among pediatricians or obstetrician/gynecologists (Tables 39, 40).

As shown in Tables 41 - 43, orientations to patients seemed to affect the rates of total resource use. Internists who indicated that a troublesome problem is that patients seek care for minor symptoms had higher rates of use for total resources.

This finding was not the same for pediatricians. However, if neurotic patients were viewed as a troublesome problem, pediatricians tended to use fewer total resources and the results were significant.

Among obstetrician/gynecologists, total resource use increased as percent of visits viewed as trivial increased. If a troublesome problem was considered to be that patients present with minor symptoms, these physicians had a higher rate of use for total resources. Rates of hospital admissions and drug orders were less.

In summary, risk-taking orientation generally did not significantly affect total resource use and social orientation was only important for internists. Orientation toward patients and views regarding patients did appear to have an effect on total resource use.

Attitudes toward Resource Use/Coverage—The physicians' perceptions of the patients' level of coverage appeared to have little impact on total resource use rates—at least for the internists and pediatricians (Tables 44, 45). Total resource use rates tended to be higher for the obstetrician/gynecologists who indicated that coverage influenced their decisions regarding resources ordered (Table 46). Presumably, those patients viewed as having the more complete coverage had more procedures performed.

As might be expected, internists who felt use of tests could be reduced, or who thought physicians were becoming dependent on diagnostic aids, tended to have lower total resource use rates (Table 47). This finding was similar for pediatricians although the differences were small and not significant (Table 49). There were no differences among obstetrician/gynecologists (Table 51).

Practice Setting Factors—Length of time in KPMCP was not significantly related to dollar rates of total resource use for internists (Table 48), although the tendency was for resource use to decrease with increased length of time with the group. Years with KPMCP was significantly and inversely associated with the rate of total resource use among pediatricians—as tenure lengthened, rates of total resource use were lower (Table 50). Obstetrician/gynecologists, who had spent more time with the group also tended to have lower rates of total resource use (Table 52).

Holding an administrative position (formal authority) in the medical group and rates of total resource use, were not related in any specialty (Tables 48, 50, 52).

As shown in Table 53, informal influence and leadership and rates of total resource use were significantly related among internists. As overall leadership and influence increased, dollar rates of total resource use decreased.

Among pediatricians, influence based on technical competency appeared to have some effect—but in the opposite direction (Table 54). Influence was positively correlated with total resource use i.e., the more influence, the greater the rate of total resource use.

Overall influence and leadership were significantly related to rates of total resource use among obstetrician/gynecologists. Leadership was associated with higher rates of resource use, (the opposite held for internists, i.e., leaders used fewer resources). Influence based on technical competency was also important among obstetrician/gynecologists in that technical influence was associated with higher rates of total resource use (Table 55).

Internists who indicated they would definitely choose this medical group again if they had the choice were significantly more likely to have lower dollar rates for total resource use (Table 56). This relationship was not found among pediatricians (Table 57). Obstetrician/gynecologists who indicated they were loyal to Oregon KPMCP tended to have lower rates of total resource use (Table 58).

In summary, length of time with the medical group affected total resource use by pediatricians and obstetrician/gynecologists but not by internists. Formal administrative position in the medical group was not significant but informal leadership and influence seemed to significantly affect resource use in all three specialties.

Work-related Factors—Neither caseload nor workload were significantly related to rates of total resource use among internists or among pediatricians (Tables 59, 60). However, there was a trend for internists with higher workloads to have lower rates of use for total resources. Caseload was not significantly associated with rates of total resource use among obstetrician/gynecologists. Workload was also not significantly related although rates of total resource use tended to be lower as workload increased (Table 61).

Physicians' perceptions and satisfaction/dissatisfaction with patient/workload were also examined relative to total resource use. As shown in Table 59, dissatisfied internists tended to have higher dollar rates of total resource use. Among pediatricians there was little relationship between satisfaction and total resource use (Table 60). Attitudes toward workload were unrelated to total use rates among obstetrician/gynecologists (Table 61).

The percentage of a physician's practice for which he/she is the regular doctor did seem to have some importance. As this percentage increased, the rates of total resource use were higher among internists. This factor was not related to resource use among pediatricians. The greater the percentage of cases where the physician was the regular doctor, the higher the rates of total resource use among obstetrician/gynecologists. However, the relationship was not statistically significant (Tables 59 - 61).

Factors Related to Resource Use-Multivariate Analysis

The bivariate analysis showed that a number of the predictor variables appeared to have some association with rates of total resource use among physicians. This section attempts to identify those factors that were the most important predictors of physicians' total resource use. A multiple regression was done within each specialty and for each conceptual area. Only those independent variables from the bivariate analysis with a significance level of $p \leq 0.25$ or less are included. The results are shown in Tables 62-66.

Among internists the most important predictors of total resource use were medical school training (public versus private), informal influence (overall leadership) and attitudes regarding whether group practice results in higher or lower patient loads compared to traditional practice. Physicians trained in private schools, who were chosen as leaders, and who felt group practice does not result in higher patient loads had lower dollar rates of resource use.

The most important predictors of total resource use among pediatricians were medical school teaching, years with the medical group, and the extent to which the stability of doctor/patient relationships was a problem. Pediatricians involved in teaching, those with shorter tenure, and those considering the stability of doctor/patient relationships to be a problem had higher rates of total resource use.

The strongest predictors of total resource use among obstetrician/gynecologists were public versus private medical school background, the extent to which patients' overconcern with minor symptoms was a problem, and percentage of patient load where the physician was the regular doctor. Higher total resource users were those from public schools, those who viewed overconcern with minor symptoms to be a problem, those with high caseloads, and those who reported being the regular doctor for a high proportion of their cases.

Rates of total resource use, then, seemed to be most affected by medical training and teaching activities, informal influence and leadership, attitudes toward patients and patient care, and work-related factors. The importance of these varied by specialty.

The next step was a multiple regression analysis which combined the most important variables from all conceptual categories (Tables 67-69). Both the forced entry method and the stepwise method were used. As might be expected, results were similar to the previous analyses, although few factors remained statistically significant when their simultaneous effects were analyzed.

SUMMARY AND CONCLUSION

The purpose of this study was to determine the extent of variation in physician behavior in the use of outpatient medical care resources and to ascertain the factors which accounted for this variation. The setting was a large prepaid group practice HMO which serves 260,000 members. Physicians from the departments of internal medicine, pediatrics, and obstetrics/ gynecology were included in the study.

The results indicated that there was considerable variation among physicians in their use of aggregate medical care resources for outpatient care. These results held for physicians within each specialty, even after adjusting for casemix.

Studies of physician behavior in use of outpatient medical care resources have focused on specific resource components such as the laboratory or radiology. This study developed a dollar measure of aggregate outpatient resource use which reflected major components of physician-directed ambulatory medical care. It did not, however, include some major components of outpatient care, such as physician office visits and telephone calls. The development of such a measure is based upon the assumption that the high use of one type of medical care resource is not necessarily an indicator of the high use of medical care resources in general. The findings generally substantiate this assumption. This suggests that all medical care resources whose use is directed by physicians should be considered when attempting to identify physicians who are high users of total medical care resources.

The study also examined the consistency over time in physicians' resource use patterns. The annual rates among individual physicians were consistent over a three-year period, suggesting that high users of outpatient medical care resources are consistently high users over time. Low users also tend to remain low users. This needs to be replicated in other settings and, if confirmed, has implications for cost containment and efficiency in providing medical care in HMO type settings.

Physicians' rates of use for various types of medical care resources were not highly related over all categories. That is, a high user in one area did not tend to be a high user in all of the other resource categories. This finding suggests that physicians apparently do not use these types of medical care resources as substitutes for each other. There was, however, a consistent positive relationship between the rates of total outpatient resource use and the hospital admission rates for each specialty. This finding suggests that physicians in this HMO may not substitute outpatient care for inpatient care but that high use of one is indicative of the high use of the other. This finding challenges one of the traditional assumptions regarding medical care utilization in HMOs and needs to be explored further.

This study developed dollar rates of total resource use per direct morbidity contact as the measure of resource use. Direct morbidity contacts reflect the total number of opportunities that physicians have to order resources. They are basically inputs in the medical care process. A more complex approach would be to aggregate the morbidity contacts into episodes and use dollar rates of total resource use per episode of care, an output of the medical care process, as the measure of resource use. However, the episode approach is not without problems and adds to the complexity of the research, both conceptually and methodologically. It also adds to the expense of the effort.

Most past studies of physician utilization have not controlled for the effects of patient characteristics and casemix. This study adjusted for patient age and broad morbidity groupings and, thus, attempted to deal with this issue. Controlling for casemix and disease severity is required in such studies in order to determine the relative importance of physician versus patient characteristics in accounting for differences in use of outpatient medical care resources. In this study, however, the adjusted rates were not very different from the unadjusted rates suggesting that physicians within each specialty generally had similar casemixes.

After adjusting for patient age and morbidity, specialty of physician accounted for approximately 70 percent of the variation in total outpatient resource use rates among physicians in this setting. This confirms the findings of previous studies indicating that a substantial share of the variation in physicians' use of resources is accounted for by specialty. This study was able to quantify the amount of the variation accounted for by specialties and affirms the importance of controlling for the effect of specialty when attempting to explain the variation in individual physician's resource use behavior.

The focus of this study was to identify the background and setting-related characteristics of physicians that account for the variation of individual physician's total outpatient resource use rates within specialty. Factors frequently investigated by other researchers as well as a number of additional variables were tested. Results of bivariate analyses identified several statistically significant relationships between rates of total resource use and physician characteristics which confirmed findings of other researchers. Examples are age, years since graduation, and medical school training. However, the presence and strength of these relationships varied by specialty. Informal influence and leadership in the medical group, commitment to group practice, attitudes toward patients, job satisfaction, and perceptions of workload also were related to resource use. Again, these results varied by specialty. Multivariate analyses generally confirmed these results. These findings suggest that both professional background as well as the work setting are sources of influence affecting physician utilization behavior.

These results should not be generalized to other HMOs or practice settings. The numbers of physicians studied was small and the setting was one HMO in a particular section of the United States. Nevertheless, some of the results may provide guidelines for future research and/or policy development.

There was a significant relationship between total resource use rates and medical training among internists and this relationship, although not statistically significant, was observed among obstetrician/gynecologists. Those trained in the public schools had higher rates. However, it is difficult to interpret this finding. The difference may relate to the degree of training in medical decision-making or may relate to the scientific orientation and/or emphasis on research. Medical schools with a heavy emphasis on research and the training of medical scientists and subspecialists may produce physicians who exhibit different resource use patterns. In this study, a measure of medical school prestige or reputation was used. This measure is correlated with medical school characteristics such as amount of research and publications, eminence of faculty, training and research grant support, size of full-time faculty, and perceived effectiveness of training. Although this measure was not significantly associated with resource use, it was significantly correlated with public/private medical school training among internists. Physicians with the public school backgrounds were more likely to be high on the measure of medical school quality or reputation. They also tended to use more resources compared to physicians in the private schools.

Another factor which could be important is the background and academic characteristics of the students who select the public or private medical school. The differences found in resource use by physicians trained in the different settings may be the result of a constellation of factors related to the setting as well as the characteristics of the students. The public/private dichotomy seems to be a surrogate or proxy measure of a combination of such factors. At any rate, the medical school environment does appear to have some independent effect on subsequent resource use. Future research should attempt to illuminate the reasons for these differences and their effects on the costs and quality of care.

Continuing education activities and current degree of involvement in scientific work by physicians seemed to have little effect on resource use. Teaching activity, however, did appear important among pediatricians where those involved in teaching had higher total resource use rates. It is recognized that involvement in medical education increases costs and that medical students and residents may have higher rates of resource use than older and more experienced physicians. The tendency is to encourage medical students and residents to be careful and thorough in patient workups and in arriving at a diagnosis. However, there may not be general recognition that the HMO physicians involved in teaching may also be higher resource users. Although these results did not remain significant in the multivariate analysis, they may be worth pursuing because of the obvious cost implications.

One possible reason why this finding was limited to pediatricians is that the pediatricians in this setting were more likely to have come from academic settings and also continued their teaching and research activities as HMO physicians. Physicians in the other two specialties were not as involved in these activities which may have affected the results relative to resource use. As more HMO physicians from the various specialties become involved in research and teaching, resource use patterns may change to reflect the pattern of the pediatricians.

Length of time in the medical group and level of informal influence and leadership appeared to be associated with total resource use in each of the specialties. It is asserted that practicing in this type of setting (because of the capitation method of financing and organizational characteristics such as the unit medical record and peer influence) leads to a different type of practice which encourages high quality care and careful use of resources by physicians. Therefore, the leaders and those who have been in the group for a longer time period should reflect these expectations in their behavior and use fewer resources. On the other hand, industrial settings have found that work groups and informal leaders may develop standards and norms regarding productivity and other aspects of work which are in conflict with official expectations and with administrative standards. Among internists, the informal leaders and influentials were lower users of resources, particularly laboratory and total. In the other two specialties, informal influence was associated with higher rates of resource use. That is, the tendency was in contradiction to what might be considered to be the organizational standards. Professional and technical considerations seemed to outweigh organizational factors. The finding suggests that physicians will not automatically practice in keeping with the assumptions and norms of prepaid group practices. As indicated earlier, physicians may feel it is in their best interest and in the patient's interest to maintain wide discretion in the performance of work and autonomy in determining conditions of work. Managers and policy makers need to understand the importance of the professional values and norms and to consider these in their approaches to management and planning. On the other hand, more conscious, deliberate and carefully planned attempts to educate and inform physicians about the underlying assumptions and ways in which HMOs operate also seem important. For these types of health care systems to succeed, physicians need to understand and practice in ways that are congruent with both the objectives of quality and efficiency. It cannot be assumed that this will just happen by participation in the group. Further research is needed to better understand the informal and formal social control mechanisms in organized settings such as prepaid group practice. Effective policy and interventions to control costs and promote quality are dependent on such knowledge.

Physicians who perceived patients' problems as trivial and their visits as unnecessary were somewhat higher users of total resources. Physicians dissatisfied with workload and with the group setting also tended to use more total measures. Physicians may order certain types of medical care resources such as laboratory procedures to control patient demand or to meet patient expectations. Ordering these procedures also may give physicians time to better assess the patient's problem. Administrative and educational approaches to encourage less costly ways of managing demand could lead to more appropriate medical care and more efficient use of resources. Physician dissatisfaction also seemed to affect resource use and administrators need to give increased attention to identifying sources of physician dissatisfaction as well as ways to decrease dissatisfaction.

The measure of total resource use developed for this study was made up of components of care where the patterns of use were not consistent among physicians. Physicians who were high users of one resource type were not necessarily high users of other types of resources. Thus, the potential effect of various characteristics associated with resource use could have been washed out or neutralized in the aggregate measure. While an aggregate measure of resource use may be the appropriate way to identify high resource users among physicians, attempting to explain variation in individual physician's resource use may be most appropriate at the level of specific components, such as laboratory, radiology, and drug orders. This approach has largely been the focus of research to date.

Although the factors discussed above may be useful in guiding subsequent research, they need to be considered in the broader context of their limited contribution to explaining the total variation in physicians' use of medical care resources.

After adjusting for casemix, there still was considerable variation in the rates of total outpatient resource use within each specialty. This finding suggests that some of this service may not be necessary or medically appropriate. There seems to be considerable potential for cost reduction through more judicious use of the types of outpatient services included in this study.

These results point out the continuing need for comparing the quality of care with the quantity of services provided. Medical educators, HMO managers and physicians, and policy makers, when faced with balancing scarce resources among competing demands, will increasingly be forced to weigh the benefits of technology and the use of technology by physicians against the associated costs. Until there is a better knowledge of the relationship between quantity and quality, effective decisions and policy will remain elusive.

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Table 1

PEARSONIAN CORRELATION COEFFICIENTS OF 5% SAMPLE DIRECT CONTACTS AND HEALTH PLAN POPULATION DIRECT CONTACTS

	Internal Medicine	Pediatrics	Obstetrics-Gynecology
r	.868	.892	.810
n	30	20	17
p	.000	.000	.000

Table 2

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED TOTAL RESOURCE USE RATES, INTERNAL MEDICINE

	1976	1977	1978
1976			
r		.763	.602
n		30	30
p		.000	.000
1977			
r			.622
n			30
p			.000

Table 3

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED TOTAL RESOURCE USE RATES, PEDIATRICS

	1976	1977	1978
1976			
r		.523	.557
n		20	20
p		.009	.005
1977			
r			.771
n			20
p			.000

Table 4

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED TOTAL RESOURCE USE RATES, OBSTETRICS-GYNECOLOGY

	1976	1977	1978
1976			
r		.696	.467
n		16	16
p		.001	.034
1977			
r			.537
n			16
p			.016

Table 5

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED LAB RESOURCE USE RATES, INTERNAL MEDICINE

	1976	1977	1978
1976			
r		.735	.552
n		30	30
p		.000	.001
1977			
r			.629
n			30
p			.000

Table 6

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED LAB RESOURCE USE RATES, PEDIATRICS

	1976	1977	1978
1976			
r		.538	.387
n		20	20
p		.007	.046
1977			
r			.771
n			20
p			.000

Table 7

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED LAB RESOURCE USE RATES, OBSTETRICS-GYNECOLOGY

	1976	1977	1978
1976			
r		.600	.357
n		16	16
p		.007	.088
1977			
r			.566
n			16
p			.011

Table 8

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED RADIOLOGY RESOURCE USE RATES, INTERNAL MEDICINE

	1976	1977	1978
1976			
r		.237	.374
n		30	30
p		.104	.021
1977			
r			.621
n			30
p			.000

Table 9

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED RADIOLOGY RESOURCE USE RATES, PEDIATRICS

	1976	1977	1978
1976			
r		.344	.170
n		20	20
p		.069	.236
1977			
r			.496
n			20
p			.013

Table 10

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED RADIOLOGY RESOURCE USE RATES, OBSTETRICS-GYNECOLOGY

	1976	1977	1978
1976			
r		.260	.010
n		16	16
p		.165	.485
1977			
r			.228
n			16
p			.198

Table 11

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED DRUG RESOURCE USE RATES, INTERNAL MEDICINE

	1976	1977	1978
1976			
r		.766	.545
n		30	30
p		.000	.001
1977			
r			.535
n			30
p			.001

Table 12

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED DRUG RESOURCE USE RATES, PEDIATRICS

	1976	1977	1978
1976			
r		.686	.852
n		20	20
p		.000	.000
1977			
r			.449
n			20
p			.024

Table 13

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED DRUG RESOURCE USE RATES, OBSTETRICS-GYNECOLOGY

	1976	1977	1978
1976			
r		.756	.654
n		16	16
p		.000	.003
1977			
r			.702
n			16
p			.001

Table 14

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED MEDICAL DIAGNOSTIC RESOURCE USE RATES, INTERNAL MEDICINE

	1976	1977	1978
1976			
r		.478	.414
n		30	30
p		.004	.011
1977			
r			.492
n			30
p			.003

Table 15

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED MEDICAL DIAGNOSTIC RESOURCE USE RATES, PEDIATRICS

	1976	1977	1978
1976			
r		.379	.451
n		20	20
p		.050	.023
1977			
r			.252
n			20
p			.142

Table 16

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED MEDICAL DIAGNOSTIC RESOURCE USE RATES, OBSTETRICS-GYNECOLOGY

	1976	1977	1978
1976			
r		.827	.419
n		16	16
p		.000	.053
1977			
r			.703
n			16
p			.001

Table 17

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED HOSPITAL ADMISSION RATES, INTERNAL MEDICINE

	1976	1977	1978
1976			
r		-.048	-.021
n		30	30
p		.401	.457
1977			
r			.346
n			30
p			.031

Table 18

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED HOSPITAL ADMISSION RATES, PEDIATRICS

	1976	1977	1978
1976			
r		-.011	-.025
n		20	20
p		.481	.458
1977			
r			-.010
n			20
p			.484

Table 19

PEARSONIAN CORRELATION COEFFICIENTS OF PHYSICIANS' ANNUAL ADJUSTED HOSPITAL ADMISSION RATES, OBSTETRICS-GYNECOLOGY

	1976	1977	1978
1976			
r		-.195	-.015
n		16	16
p		.234	.478
1977			
r			.218
n			16
p			.209

Table 20

PEARSONIAN CORRELATION COEFFICIENTS FOR PHYSICIANS' ADJUSTED RESOURCE USE RATES, ALL YEARS, INTERNAL MEDICINE

	Total Rate	Laboratory Rate	Radiology Rate	Diagnostic Rate	Drug Rate	Hospital Rate
Total Rate						
r		.817	.662	.508	.543	.264
n		30	30	30	30	30
p		.000	.000	.002	.001	.079
Laboratory Rate						
r			.394	.190	.198	.204
n			30	30	30	30
p			.016	.158	.147	.139
Radiology Rate						
r				.185	.172	.136
n				30	30	30
p				.164	.182	.237
Medical Diagnostic Rate						
r					.264	.155
n					30	30
p					.079	.207
Drug Rate						
r						.122
n						30
p						.261

Table 21

PEARSONIAN CORRELATION COEFFICIENTS FOR PHYSICIANS' ADJUSTED RESOURCE USE RATES, ALL YEARS, PEDIATRICS

	Total Rate	Laboratory Rate	Radiology Rate	Diagnostic Rate	Drug Rate	Hospital Rate
Total Rate						
r		.945	.763	.085	.554	.540
n		20	20	20	20	20
p		.000	.000	.361	.006	.007
Laboratory Rate						
r			.645	-.016	.428	.429
n			20	20	20	20
p			.001	.473	.030	.030
Radiology Rate						
r				-.140	.195	.504
n				20	20	20
p				.278	.205	.012
Medical Diagnostic Rate						
r					-.077	.134
n					20	20
p					.373	.286
Drug Rate						
r						.243
n						20
p						.151

Table 22

PEARSONIAN CORRELATION COEFFICIENTS FOR PHYSICIANS' ADJUSTED RESOURCE USE RATES, ALL YEARS, OBSTETRICS-GYNECOLOGY

	Total Rate	Laboratory Rate	Radiology Rate	Diagnostic Rate	Drug Rate	Hospital Rate
Total Rate						
r		.809	.578	.750	-.092	.381
n		17	17	17	17	17
p		.000	.008	.000	.362	.066
Laboratory Rate						
r			.460	.460	-.344	.316
n			17	17	17	17
p			.032	.031	.088	.109
Radiology Rate						
r				.292	-.261	.003
n				17	17	17
p				.128	.155	.495
Medical Diagnostic Rate						
r					-.227	.386
n					17	17
p					.190	.063
Drug Rate						
r						-.423
n						17
p						.045

Table 23

COEFFICIENT OF VARIATION (%) OF ADJUSTED RESOURCE USE RATES

	Laboratory	Radiology	Drugs	Total	Hospital
Internal Medicine (n=30)					
Minimum	5.6	9.2	5.3	4.0	22.1
Maximum	18.8	19.9	20.5	10.0	50.3
Mean	9.6	13.4	9.2	6.1	37.4
Median	8.6	12.7	9.1	5.9	36.1
Pediatrics (n=20)					
Minimum	8.3	12.7	4.0	5.0	20.8
Maximum	20.3	32.0	8.8	11.9	87.3
Mean	11.5	21.4	6.1	7.3	48.5
Median	10.3	20.4	6.1	7.0	43.7
Obstetrics/Gynecology (n=17)					
Minimum	6.6	18.2	9.7	5.7	9.2
Maximum	12.4	96.0	17.4	13.4	14.4
Mean	9.2	34.0	12.3	8.4	11.6
Median	9.0	29.8	12.3	7.6	11.3

Table 24

PERCENTAGE DISTRIBUTION OF ADJUSTED RESOURCE USE RATES BY SPECIALTY

	N	Percent	Laboratory Rate ($)	Radiology Rate ($)	Drug Rate ($)	Diagnostic Rate ($)	Total Rate ($)	Hospital Admission Rate x 100
Internal Medicine								
Low	10	33.3	1.62-4.95	1.86-2.74	2.13-3.05	0.42-1.16	9.72-12.54	0.42-0.87
Medium	10	33.3	4.96-6.05	2.75-3.74	3.06-3.82	1.17-1.57	12.55-14.66	0.88-1.40
High	10	33.3	6.06-8.40	3.75-5.39	3.83-4.99	1.58-2.66	14.67-18.32	1.41-2.60
Total	30	99.9						
Mean			5.40	3.26	3.46	1.39	13.91	1.20
S.D.			1.47	0.83	0.75	0.52	2.49	0.50
Coefficient of Variation			0.27	0.25	0.22	0.37	0.18	0.42
Pediatrics								
Low	7	35.0	1.14-1.92	0.47-0.83	1.46-1.80	0.06-0.20	4.23-5.04	0.12-0.33
Medium	7	35.0	1.93-2.72	0.84-1.23	1.81-1.99	0.21-0.28	5.05-6.65	0.34-0.65
High	6	30.0	2.73-4.44	1.24-1.79	2.00-2.39	0.29-0.64	6.66-8.57	0.66-1.08
Total	20	100.0						
Mean			2.43	1.06	1.89	0.29	5.97	0.50
S.D.			0.82	0.39	0.27	0.19	1.25	0.30
Coefficient of Variation			0.34	0.37	0.14	0.66	0.21	0.60
Obstetrics-Gynecology								
Low	6	35.3	3.21-6.64	0.21-1.23	1.01-1.58	0.29-0.67	7.99-12.09	4.84-5.93
Medium	6	35.3	6.65-7.63	1.24-1.65	1.59-1.98	0.68-1.47	12.10-14.24	5.94-6.46
High	5	29.4	7.64-9.60	1.66-3.38	1.99-3.03	1.48-4.44	14.25-19.00	6.47-8.84
Total	17	100.0						
Mean			6.85	1.53	1.87	1.45	13.67	6.40
S.D.			1.71	0.76	0.56	1.29	3.30	1.00
Coefficient of Variation			0.25	0.50	0.30	0.89	0.24	0.16

Table 25

AVERAGE ADJUSTED RESOURCE USE RATES BY SPECIALTY

	Internal Medicine (n=30)	Pediatrics (n=20)	Obstetrics/ Gynecology (n=17)	TOTAL (n=67)	P Value	Eta Squared*
Laboratory Rate ($)						
Average	5.40	2.43	6.85	4.88	0.000	0.614
S.D.	1.47	0.82	1.71	2.19		
Radiology Rate ($)						
Average	3.26	1.06	1.53	2.17	0.000	0.677
S.D.	0.83	0.39	0.76	1.23		
Drug Rate ($)						
Average	3.46	1.89	1.87	2.59	0.000	0.644
S.D.	0.75	0.27	0.56	0.99		
Total Rate ($)						
Average	13.91	5.97	13.67	11.48	0.000	0.693
S.D.	2.49	1.25	3.29	4.35		
Hospital Admission Rate x 100						
Average	1.18	0.51	6.35	2.29	0.000	0.939
S.D.	0.54	0.26	0.97	2.48		

*Eta^2 = percent of variation accounted for by specialty.

Table 26
MEDICAL TRAINING AND ADJUSTED RESOURCE USE RATES, INTERNAL MEDICINE†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Years Since Graduation															
<13 years	5.50	.884	12	3.22	.494	12	3.39	.408	12	13.88	.487	12	1.14	.637	12
13+ years	5.58		14	3.44		14	3.65		14	14.55		14	1.25		14
Corr. coeff.	r = −.220			r = .024			r = .103			r = −.030			r = .153		
Sig.	p = .140			p = .454			p = .308			p = .443			p = .228		
Age															
<43 years	5.62	.428	15	3.32	.734	15	3.51	.695	15	14.24	.480	15	1.12	.537	15
43+ years	5.18		15	3.21		15	3.40		15	13.58		15	1.25		15
Corr. coeff.	r = −.170			r = −.099			r = −.039			r = −.145			r = .064		
Sig.	p = .184			p = .301			p = .419			p = .223			p = .369		
Medical School															
Private	4.72	.128	12	2.90	.264	12	3.19	.213	12	12.34	.026	12*	1.00	.215	12
Public	5.59		14	3.21		14	3.53		14	14.19		14	1.24		14
Prestige - Medical School															
Low	5.13	.982	9	3.19	.740	9	3.14	.262	9	13.15	.892	9	0.96	.396	9
Medium	5.26		9	2.93		9	3.67		9	13.62		9	1.17		9
High	5.17		8	3.08		8	3.30		8	13.22		8	1.28		8
Corr. coeff.	r = −.050			r = −.284			r = −.040			r = −.178			r = .230		
Sig.	p = .404			p = .080			p = .423			p = .193			p = .129		
Residency - University Affiliated															
Yes	5.30	.635	17	3.32	.949	17	3.43	.738	17	13.80	.644	17	1.27	.411	17
No	5.57		12	3.30		12	3.53		12	14.25		12	1.10		12
% Subspecialty Practice															
0 %	5.18	.295	19	3.25	.932	19	3.42	.760	19	13.54	.300	19	1.06	.092	19
1+ %	5.78		11	3.28		11	3.51		11	14.54		11	1.40		11
Corr. coeff.	r = .039			r = −.110			r = .174			r = .069			r = .273		
Sig.	p = .418			p = .281			p = .179			p = .360			p = .072		

†Not ascertained responses are excluded; the sum of n does not always equal 30.
*p<.05

Table 27

MEDICAL TRAINING AND ADJUSTED RESOURCE USE RATES, PEDIATRICS†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Years Since Graduation															
<16 years	2.50	.630	9	1.07	.871	9	1.95	.133	9	6.16	.427	9	0.44	.241	9
16+ years	2.30		9	1.04		9	1.77		9	5.67		9	0.59		9
Corr. coeff.	r = −.239			r = −.024			r = −.178			r = −.265			r = .270		
Sig.	p = .170			p = .463			p = .240			p = .144			p = .140		
Age															
<42 years	2.59	.409	10	1.11	.637	10	1.96	.249	10	6.27	.301	10	0.46	.370	10
42+ years	2.28		10	1.02		10	1.82		10	5.68		10	0.56		10
Corr. coeff.	r = −.430*			r = −.217			r = −.241			r = −.446*			r = .163		
Sig.	p = .029			p = .179			p = .153			p = .024			p = .245		
Medical School															
Private	2.20	.435	6	1.04	.925	6	1.89	.798	6	5.74	.685	6	0.64	.110	6
Public	2.55		11	1.06		11	1.85		11	6.02		11	0.43		11
Prestige – Medical School															
Low	2.42	.892	6	0.91	.534	6	1.80	.651	6	5.79	.770	6	0.49	.552	6
Medium	2.28		5	1.17		5	1.84		5	5.69		5	0.41		5
High	2.55		6	1.11		6	1.94		6	6.24		6	0.59		6
Corr. coeff.	r = −.081			r = .196			r = .056			r = .018			r = .221		
Sig.	p = .379			p = .225			p = .416			p = .473			p = .197		
Residency – University Affiliated															
Yes	2.45	.778	14	1.01	.713	14	1.83	.231	14	5.89	.973	14	0.48	.502	14
No	2.32		5	1.08		5	2.00		5	5.91		5	0.58		5
% Subspecialty Practice															
0 %	1.94	.011*	8	0.90	.045*	8	1.88	.819	8	5.18	.011*	8	0.44	.381	8
1+ %	2.91		10	1.26		10	1.85		10	6.65		10	0.55		10
Corr. coeff.	r = .256			r = .118			r = −.149			r = .242			r = .155		
Sig.	p = .152			p = .320			p = .277			p = .167			p = .270		

†Not ascertained responses are excluded; the sum of n does not always equal 20.

* $p < .05$

Table 28
MEDICAL TRAINING AND ADJUSTED RESOURCE USE RATES, OBSTETRICS/GYNECOLOGY†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Years Since Graduation															
<21 years	7.46	.119	7	1.59	.796	7	2.03	.453	7	14.41	.203	7	6.35	.610	7
21+ years	5.96		7	1.47		7	1.80		7	12.15		7	6.12		7
Corr. coeff.	r = -.498*			r = -.112			r = -.167			r = -.318			r = -.100		
Sig.	p = .035			p = .352			p = .284			p = .134			p = .367		
Age															
<45 years	7.37	.236	8	1.39	.777	8	1.85	.853	8	14.33	.429	8	6.62	.349	8
45+ years	6.30		8	1.50		8	1.90		8	12.93		8	6.13		8
Corr. coeff.	r = -.471*			r = -.013			r = -.028			r = -.293			r = -.190		
Sig.	p = .033			p = .481			p = .458			p = .136			p = .240		
Medical School															
Private	4.78	.026	4*	0.97	.230	4	2.25	.080	4	11.25	.325	4	6.54	.492	4
Public	7.24		7	1.61		7	1.63		7	13.36		7	6.13		7
Prestige - Medical School															
Low	7.53	.466	3	2.17	.126	3	1.44	.100	3	15.01	.153	3	6.90	.413	3
Medium	5.70		4	0.96		4	1.70		4	10.29		4	5.97		4
High	6.11		4	1.19		4	2.32		4	13.08		4	6.12		4
Corr. coeff.	r = -.463			r = -.474			r = .689*			r = -.251			r = -.049		
Sig.	p = .076			p = .071			p = .010			p = .229			p = .444		
Residency - University Affiliated															
Yes	7.07	.569	7	1.42	.474	7	1.83	.826	7	14.09	.884	7	6.86	.194	7
No	7.50		7	1.68		7	1.76		7	14.35		7	6.17		7
% Subspecialty Practice	Only three responded with percent of subspecialty; did not compute chi square.														
Corr. coeff.	r = -.207			r = -.197			r = .453			r = -.036			r = .275		
Sig.	p = .239			p = .250			p = .052*			p = .452			p = .171		

†Not ascertained responses are excluded; the sum of n does not always equal 17.
* $p \leq .05$

Table 29
PROFESSIONAL/SCIENTIFIC ACTIVITIES AND ADJUSTED RESOURCE USE RATES, INTERNAL MEDICINE†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Number Courses Attended															
0–6 courses	6.04	.129	11	3.33	.978	11	3.40	.801	11	14.72	.380	11	1.08	.148	11
7+ courses	5.25		11	3.34		11	3.48		11	13.86		11	1.44		11
Corr. coeff.	r =	.103		r =	.076		r =	.257		r =	.143		r =	.414*	
Sig.	p =	.324		p =	.368		p =	.124		p =	.263		p =	.028	
Teaching Medical School Now															
Not mentioned	5.13	.183	19	3.07	.095	19	3.45	.935	19	13.43	.171	19	1.07	.126	19
Mentioned	5.87		11	3.60		11	3.47		11	14.73		11	1.38		11
Publish/Present Scientific Papers															
No	5.66	.522	18	3.30	.717	18	3.46	.485	18	14.07	.593	18	1.22	.762	18
Yes	5.27		8	3.42		8	3.69		8	14.63		8	1.15		8

Table 30
PRIOR PRACTICE EXPERIENCE, LOCATION OF PRACTICE AND ADJUSTED RESOURCE USE RATES, INTERNAL MEDICINE†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Prior Practice Experience															
Residency	5.40	.999	14	3.44	.295	14	3.38	.597	14	13.79	.807	14	1.20	.895	14
Other	5.40		16	3.11		16	3.53		16	14.01		16	1.17		16
Location of Practice															
Hospital clinic	4.69	.149	7	3.75	.077	7	3.56	.686	7	13.67	.776	7	1.37	.291	7
Free-standing clinic	5.62		23	3.12		23	3.42		23	13.98		23	1.13		23

†Not ascertained responses are excluded; the sum of n does not always equal 30.

*$p \leq .05$

Table 31
PROFESSIONAL/SCIENTIFIC ACTIVITIES AND ADJUSTED RESOURCE USE RATES, PEDIATRICS†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admissio Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Number Courses Attended															
0-5 courses	2.40	.920	10	1.05	.645	10	1.92	.128	10	5.89	.812	10	0.55	.449	10
6+ courses	2.35		7	0.96		7	1.73		7	5.73		7	0.44		7
Corr. coeff.	r = .112			r = -.162			r = -.189			r = .030			r = -.415*		
Sig.	p = .335			p = .268			p = .234			p = .455			p = .049		
Teaching Medical School Now															
Not mentioned	1.97	.047	8*	1.01	.857	8	1.82	.433	8	5.35	.101	8	0.39	.110	8
Mentioned	2.74		11	1.04		11	1.92		11	6.29		11	0.59		11
Publish/Present Scientific Papers															
No	2.19	.136	12	0.98	.250	12	1.83	.501	12	5.62	.171	12	0.54	.545	12
Yes	2.82		6	1.21		6	1.92		6	6.51		6	0.46		6

Table 32
PRIOR PRACTICE EXPERIENCE, LOCATION OF PRACTICE AND ADJUSTED RESOURCE USE RATES, PEDIATRICS†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Prior Practice Experience															
Residency	2.84	.264	5	1.18	.532	5	1.94	.647	5	6.47	.373	5	0.64	.257	5
Other	2.35		14	1.05		14	1.88		14	5.86		14	0.48		14
Location of Practice															
Hospital clinic	2.62	.660	5	1.14	.700	5	1.85	.719	5	6.30	.585	5	0.64	.254	5
Free-standing clinic	2.42		14	1.06		14	1.91		14	5.93		14	0.48		14

†Not ascertained responses are excluded; the sum of *n* does not always equal 20.

* $p \leq .05$

Table 33
PROFESSIONAL/SCIENTIFIC ACTIVITIES AND ADJUSTED RESOURCE USE RATES, OBSTETRICS/GYNECOLOGY†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Number Courses Attended															
0-8 courses	6.16	.334	7	1.10	.034	7*	1.97	.797	7	12.31	.292	7	6.51	.267	7
9+ courses	7.19		6	2.08		6	1.88		6	14.36		6	5.98		6
Corr. coeff.	r = .211			r = .455			r = -.388			r = .199			r = -.252		
Sig.	p = .244			p = .059			p = .095			p = .257			p = .203		
Teaching Medical School Now															
Not mentioned	7.73	.158	9	1.74	.122	9	1.74	.436	9	14.59	.796	9	6.42	.431	9
Mentioned	6.56		4	1.10		4	2.00		4	14.06		4	6.91		4
Publish/Present Scientific Papers															
No															
Yes	Only one response in "yes"category; did not compute.														

Table 34
PRIOR PRACTICE EXPERIENCE, LOCATION OF PRACTICE AND ADJUSTED RESOURCE USE RATES, OBSTETRICS/GYNECOLOGY†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Prior Practice Experience															
Residency	7.52	.049	10*	1.71	.258	10	1.73	.255	10	14.99	.044	10*	6.31	.849	10
Other	5.89		7	1.27		7	2.05		7	11.78		7	6.41		7
Location of Practice															
Hospital clinic	6.92	.931	4	1.30	.503	4	2.17	.231	4	14.41	.621	4	6.39	.935	4
Free-standing clinic	6.83		13	1.60		13	1.77		13	13.44		13	6.34		13

†Not ascertained responses are excluded; the sum of n does not always equal 17.

* $p \leq .05$

Table 35
STYLE-ORIENTATION TO RISK TAKING AND ADJUSTED RESOURCE USE RATES, INTERNAL MEDICINE[†]

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Compared to Colleagues in Department, Self-Assessment, Conservatism															
More	6.14	.131	7	3.68	.135	7	3.39	.798	7	15.19	.121	7	1.20	.933	7
Less, same	5.18		23	3.14		23	3.48		23	13.52		23	1.18		23
Trend Over Time - Becoming More, Less Conservative															
More	5.37	.755	8	3.35	.718	8	3.66	.513	8	14.81	.344	8	1.47	.118	8
Less, same	5.56		20	3.22		20	3.45		20	13.81		20	1.12		20
Antibacterial Treatment for Infection - Males															
Probably yes	5.20	.586	11	3.33	.753	11	3.18	.126	11	13.14	.207	11	0.95	.069	11
Probably no	5.51		19	3.23		19	3.62		19	14.35		19	1.32		19
Antibacterial Treatment for Infection - Females															
Probably yes	4.84	.423	4	3.05	.585	4	3.65	.594	4	13.33	.626	4	0.99	.450	4
Probably no	5.49		26	3.30		26	3.43		26	14.00		26	1.21		26
Antibacterial Treatment for Infection - Tonsils															
Probably yes	5.34	.732	25	3.21	.769	25	3.40	.942	25	13.71	.627	25	1.21	.211	25
Probably no	5.62		4	3.35		4	3.43		4	14.37		4	0.85		4
Antibacterial Treatment for Infection - Gonorrhea															
Probably yes	5.27	.322	24	3.31	.589	24	3.40	.444	24	13.73	.446	24	1.20	.706	24
Probably no	5.94		6	3.10		6	3.67		6	14.62		6	1.11		6

[†] Not ascertained responses are excluded; the sum of n does not always equal 30.

*$p \leq .05$

Table 36
STYLE/ORIENTATION TO RISK TAKING AND ADJUSTED RESOURCE USE RATES, PEDIATRICS†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admissio Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Compared to Collcagues in Department, Self-Assessment, Conservatism															
More	2.32	.645	5	1.01	.586	5	1.80	.483	5	5.57	.388	5	0.40	.237	5
Less, same	2.53		12	1.12		12	1.91		12	6.17		12	0.57		12
Trend Over Time - Becoming More, Less Conservative															
More	2.67	.348	7	1.18	.278	7	1.90	.844	7	6.32	.307	7	0.61	.147	7
Less, same	2.28		11	0.98		11	1.87		11	5.69		11	0.43		11
Antibacterial Treatment for Infection - Males															
Probably yes	2.87	.379	3	1.16	.722	3	1.86	.795	3	6.46	.524	3	0.45	.648	3
Probably no	2.40		16	1.07		16	1.90		16	5.94		16	0.53		16
Antibacterial Treatment for Infection - Females															
Probably yes	3.26	.027	4*	1.21	.469	4	2.11	.073	4	7.04	.067	4	0.42	.423	4
Probably no	2.27		15	1.05		15	1.84		15	5.75		15	0.55		15
Antibacterial Treatment for Infection - Tonsils															
Probably yes	2.28	.660	5	1.09	.885	5	2.09	.065	5	6.01	.926	5	0.63	.212	5
Probably no	2.48		12	1.06		12	1.81		12	5.94		12	0.44		12
Antibacterial Treatment for Infection - Gonorrhea															
Probably yes	2.62	.181	12	1.19	.037	12*	1.89	.821	12	6.27	.107	12	0.57	.116	12
Probably no	2.06		6	0.80		6	1.86		6	5.27		6	0.37		6

†Not ascertained responses are excluded; the sum of _n_ does not always equal 20.

*$p \leq .05$

Table 37
STYLE-ORIENTATION TO RISK TAKING AND ADJUSTED RESOURCE USE RATES, OBSTETRICS/GYNECOLOGY†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Compared to Colleagues in Department, Self-Assessment, Conservatism															
More	7.00	.771	7	1.61	.723	7	1.74	.443	7	12.84	.400	7	6.30	.861	7
Less, same	6.74		10	1.47		10	1.96		10	14.25		10	6.39		10
Trend Over Time - Becoming More, Less Conservative															
More	7.33	.168	10	1.44	.556	10	1.73	.237	10	13.77	.887	10	6.50	.476	10
Less, same	6.15		7	1.67		7	2.06		7	13.53		7	6.14		7
Antibacterial Treatment for Infection - Males															
Probably yes	Only seven responses with "yes" or "no"; did not compute.														
Probably no															
Antibacterial Treatment for Infection - Females															
Probably yes	5.75	.108	5	1.78	.452	5	1.82	.798	5	12.73	.473	5	5.99	.314	5
Probably no	7.27		11	1.45		11	1.90		11	14.10		11	6.55		11
Antibacterial Treatment for Infection - Tonsils															
Probably yes	5.67	.028	7*	1.00	.008	7*	2.01	.515	7	11.55	.010	7*	6.04	.240	7
Probably no	7.77		7	2.06		7	1.79		7	16.15		7	6.73		7
Antibacterial Treatment for Infection - Gonorrhea															
Probably yes	6.92	.866	9	1.58	.803	9	1.87	.986	9	13.75	.915	9	6.62	.244	9
Probably no	6.77		8	1.48		8	1.86		8	13.57		8	6.05		8

†Not ascertained responses are excluded; the sum of n does not always equal 17.

*$p \leq .05$

Table 38
STYLE/ORIENTATION TO MEDICINE AND ADJUSTED RESOURCE USE RATES, INTERNAL MEDICINE†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admissio Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Social Orientation to Medicine															
Favor	5.31	.298	21	3.29	.617	21	3.36	.090	21	13.68	.088	21	1.10	.117	21
Oppose	5.99		7	3.47		7	3.92		7	15.48		7	1.48		7
Interest: Psycho-Social Medicine															
Very interested	5.67	.263	17	3.23	.814	17	3.33	.289	17	14.10	.637	17	1.19	.913	17
Some, not interested	5.05		13	3.31		13	3.63		13	13.66		13	1.17		13
Is Interpersonal Element Important?															
Very important	5.36	.839	19	3.35	.449	19	3.44	.888	19	13.94	.921	19	1.22	.602	19
Some, not important	5.47		11	3.11		11	3.48		11	13.85		11	1.11		11

†Not ascertained responses are excluded; the sum of n does not always equal 30.
*p ≤.05

Table 39
STYLE/ORIENTATION TO MEDICINE AND ADJUSTED RESOURCE USE RATES, PEDIATRICS†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Social Orientation to Medicine															
Favor	2.52	.938	12	1.05	.830	12	1.85	.281	12	6.00	.775	12	0.59	.154	12
Oppose	2.48		5	1.10		5	2.02		5	6.21		5	0.39		5
Interest: Psycho-Social Medicine															
Very interested	2.51	.869	9	1.11	.815	9	1.84	.400	9	6.16	.675	9	0.60	.244	9
Some, not interested	2.45		10	1.06		10	1.95		10	5.90		10	0.45		10
Is Interpersonal Element Important?															
Very important	2.50	.833	14	1.11	.659	14	1.92	.469	14	6.16	.457	14	0.55	.400	14
Some, not important	2.41		5	1.02		5	1.82		5	5.65		5	0.43		5

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†Not ascertained responses are excluded; the sum of n does not always equal 20.

*$p \leq .05$

Table 40
STYLE/ORIENTATION TO MEDICINE AND ADJUSTED RESOURCE USE RATES, OBSTETRICS/GYNECOLOGY†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Social Orientation to Medicine															
Favor	7.12	.605	13	1.64	.361	13	1.68	.042	13*	13.78	.910	13	6.40	.865	13
Oppose	6.56		3	1.17		3	2.30		3	14.04		3	6.50		3
Interest: Psycho-Social Medicine															
Very interested	7.17	.588	7	1.48	.842	7	1.90	.958	7	14.27	.641	7	6.41	.916	7
Some, not interested	6.67		9	1.56		9	1.88		9	13.44		9	6.36		9
Is Interpersonal Element Important?															
Very important	6.94	.766	11	1.70	.217	11	2.00	.171	11	13.91	.701	11	6.25	.562	11
Some, not important	6.67		6	1.21		6	1.61		6	13.23		6	6.54		6

†Not ascertained responses are excluded; the sum of n does not always equal 17.

*$p \leq .05$

Table 41
ORIENTATION TO PATIENTS AND ADJUSTED RESOURCE USE RATES, INTERNAL MEDICINE†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Desirability of "Regular Doctor"															
Very preferable	5.35	.762	21	3.09	.072	21	3.39	.433	21	13.52	.194	21	1.15	.571	21
Some, no difference	5.53		9	3.68		9	3.63		9	14.82		9	1.27		9
Percent of Patients Troublesome															
1-4 %	4.95	.653	7	3.20	.571	7	3.51	.524	7	13.37	.792	7	1.11	.351	7
5 %	5.59		12	3.11		12	3.61		12	13.93		12	1.05		12
6+%	5.49		11	3.48		11	3.25		11	14.22		11	1.37		11
Corr. coeff.	r = −.110			r = .095			r = −.140			r = −.021			r = .188		
Sig.	p = .281			p = .309			p = .231			p = .457			p = .160		
Percent Patient Visits Trivial															
1-29 %	5.15	.386	14	3.00	.109	14	3.60	.345	14	13.53	.448	14	1.00	.072	14
30+%	5.62		16	3.49		16	3.33		16	14.24		16	1.35		16
Corr. coeff.	r = .127			r = .334*			r = −.270			r = .110			r = .080		
Sig.	p = .251			p = .036			p = .074			p = .281			p = .336		
Problem: Patient Overconcern Symptoms															
Troublesome	5.91	.100	13	3.51	.157	13	3.54	.620	13	14.69	.136	13	1.41	.042	13*
Somewhat, no problem	5.01		17	3.07		17	3.40		17	13.31		17	1.01		17
Problem: Patient Neurotic Personality															
Troublesome	5.23	.688	9	3.28	.948	9	3.68	.303	9	14.05	.837	9	1.32	.381	9
Somewhat, no problem	5.47		21	3.26		21	3.36		21	13.84		21	1.13		21

†Not ascertained responses are excluded; the sum of _n_ does not always equal 30.
* p ≤.05

Table 42
ORIENTATION TO PATIENTS AND ADJUSTED RESOURCE USE RATES, PEDIATRICS†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Desirability of "Regular Doctor"															
Very preferable	2.39	.512	13	1.09	.883	13	1.87	.947	13	5.93	.711	13	0.49	.832	13
Some, no difference	2.70		5	1.12		5	1.86		5	6.19		5	0.52		5
Percent of Patients Troublesome															
1-4 %	2.44	.830	10	1.06	.621	10	1.92	.305	10	5.97	.926	10	0.50	.991	10
5+%	2.53		8	1.15		8	1.80		8	6.03		8	0.50		8
Corr. coeff.	r = .010			r = .044			r = -.316			r = -.031			r = -.094		
Sig.	p = .484			p = .431			p = .101			p = .451			p = .356		
Percent Patient Visit Trivial															
1-29 %	2.74	.194	9	1.19	.285	9	1.91	.822	9	6.32	.339	9	0.53	.829	9
30+%	2.24		10	0.99		10	1.88		10	5.75		10	0.51		10
Corr. coeff.	r = -.241			r = -.178			r = -.012			r = -.158			r = -.082		
Sig.	p = .160			p = .233			p = .480			p = .259			p = .370		
Problem: Patient Overconcern Symptoms															
Troublesome	2.49	.939	11	1.01	.351	11	1.94	.370	11	5.97	.824	11	0.52	.924	11
Somewhat, no problem	2.46		8	1.18		8	1.83		8	6.10		8	0.53		8
Problem: Patient Neurotic Personality															
Troublesome, somewhat	2.02	.100	6	0.92	.230	6	1.72	.055	6*	5.20	.049	6*	0.42	.281	6
No problem	2.69		13	1.16		13	1.98		13	6.40		13	0.57		13

†Not ascertained responses are excluded; the sum of n does not always equal 20.

* $p \leq .05$

Table 43
ORIENTATION TO PATIENTS AND ADJUSTED RESOURCE USE RATES, OBSTETRICS/GYNECOLOGY†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Desirability of "Regular Doctor"															
Very preferable	7.02	.376	14	1.55	.809	14	1.89	.700	14	14.04	.334	14	6.44	.435	14
Some, no difference	6.03		3	1.43		3	1.75		3	11.95		3	5.94		3
Percent of Patients Troublesome															
1-4 %	6.29	.276	7	1.21	.150	7	1.76	.531	7	11.62	.026	7*	6.04	.276	7
5+%	7.24		10	1.76		10	1.94		10	15.11		10	6.57		10
Corr. coeff.	r = .173			r = .316			r = -.074			r = .152			r = .094		
Sig.	p = .254			p = .108			p = .388			p = .280			p = .360		
Percent Patient Visits Trivial															
1-14 %	6.58	.513	9	1.21	.063	9	2.01	.279	9	13.34	.681	9	6.42	.765	9
15+%	7.15		8	1.89		8	1.70		8	14.04		8	6.27		8
Corr. coeff.	r = .339			r = .290			r = -.124			r = .263			r = -.018		
Sig.	p = .091			p = .129			p = .318			p = .154			p = .472		
Problem: Patient Overconcern Symptoms															
Troublesome	7.71	.260	4	2.11	.082	4	1.87	.989	4	15.92	.121	4	6.16	.670	4
Somewhat, no problem	6.58		13	1.35		13	1.86		13	12.98		13	6.41		13
Problem: Patient Neurotic Personality															
Troublesome, somewhat	7.07	.345	13	1.49	.735	13	1.76	.188	13	13.90	.620	13	6.56	.112	13
No problem	6.12		4	1.65		4	2.19		4	12.92		4	5.67		4

†Not ascertained responses are excluded; the sum of n does not always equal 17.

* $p \leq .05$

Table 44
MEDICAL COVERAGE AND ADJUSTED RESOURCE USE RATES, INTERNAL MEDICINE†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Does Class Coverage Influence Resources Ordered?															
No influence	5.17	.577	12	2.96	.143	12	3.39	.852	12	13.15	.247	12	1.33	.301	12
Influence	5.48		17	3.41		17	3.44		17	14.23		17	1.12		17

†Not ascertained responses are excluded; the sum of n does not always equal 30.

* p ≤.05

Table 45
MEDICAL COVERAGE AND ADJUSTED RESOURCE USE RATES, PEDIATRICS†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Does Class Coverage Influence Resources Ordered?															
No influence	2.43	.851	8	1.17	.407	8	1.85	.537	8	5.95	.829	8	0.50	.795	8
Influence	2.51		11	1.02		11	1.93		11	6.08		11	0.53		11

†Not ascertained responses are excluded; the sum of n does not always equal 20.

* p ≤.05

Table 46
MEDICAL COVERAGE AND ADJUSTED RESOURCE USE RATES, OBSTETRICS/GYNECOLOGY†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Does Class Coverage Influence Resources Ordered?															
No influence	6.48	.048	14*	1.53	.971	14	1.79	.270	14	13.12	.144	14	6.41	.636	14
Influence	8.58		3	1.54		3	2.20		3	16.23		3	6.10		3

†Not ascertained responses are excluded; the sum of n does not always equal 17.

* $p \leq .05$

Table 47
PHYSICIANS' ATTITUDES REGARDING UTILIZATION AND ADJUSTED RESOURCE USE RATES, INTERNAL MEDICINE†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Physicians Too Dependent on Aids/Consultations															
Agree	5.31	.558	23	3.47	.010	23*	3.51	.501	23	14.14	.363	23	1.18	.939	23
Disagree	5.69		7	2.58		7	3.29		7	13.14		7	1.20		7
Could Use of Tests Be Reduced?															
Yes	5.11	.328	19	3.11	.043	19*	3.38	.486	19	13.48	.253	19	1.27	.097	19
No	5.82		6	3.89		6	3.63		6	14.89		6	0.84		6

Table 48
LENGTH OF TIME IN GROUP, FORMAL AUTHORITY AND ADJUSTED RESOURCE USE RATES, INTERNAL MEDICINE†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Years with Kaiser-Permanente															
<6 years	5.73	.230	15	3.19	.628	15	3.49	.825	15	14.22	.503	15	1.14	.647	15
6+ years	5.07		15	3.34		15	3.43		15	13.60		15	1.23		15
Corr. coeff.	r = −.257			r = .050			r = −.134			r = −.170			r = .052		
Sig.	p = .085			p = .397			p = .240			p = .185			p = .392		
Held Administrative Office in Medical Group															
Yes	4.77	.106	8	3.50	.487	8	3.61	.535	8	13.86	.862	8	1.41	.216	8
No	5.69		16	3.24		16	3.40		16	14.04		16	1.09		16

†Not ascertained responses are excluded; the sum of n does not always equal 30.

* $p \le .05$

Table 49
PHYSICIANS' ATTITUDES REGARDING UTILIZATION AND ADJUSTED RESOURCE USE RATES, PEDIATRICS†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Physicians Too Dependent on Aids/Consultations															
Agree	2.39	.584	11	0.97	.144	11	1.88	.808	11	5.83	.455	11	0.54	.697	11
Disagree	2.60		8	1.24		8	1.91		8	6.29		8	0.49		8
Could Use of Tests Be Reduced?															
Yes	2.33	.218	12	1.08	.910	12	1.87	.985	12	5.89	.479	12	0.53	.905	12
No	2.91		5	1.11		5	1.88		5	6.41		5	0.51		5

Table 50
LENGTH OF TIME IN GROUP, FORMAL AUTHORITY AND ADJUSTED RESOURCE USE RATES, PEDIATRICS†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Years with Kaiser-Permanente															
<6 years	2.69	.288	9	1.07	.927	9	1.95	.442	9	6.29	.393	9	0.46	.338	9
6+ years	2.28		10	1.09		10	1.85		10	5.78		10	0.58		10
Corr. coeff.	r = -.456*			r = -.117			r = -.067			r = -.394*			r = .134		
Sig.	p = .025			p = .316			p = .393			p = .047			p = .292		
Held Administrative Office in Medical Group															
Yes	2.45	.900	4	1.23	.328	4	1.96	.387	4	6.05	.824	4	0.58	.599	4
No	2.38		14	1.01		14	1.83		14	5.88		14	0.49		14

†Not ascertained responses are excluded; the sum of n does not always equal 20.

* $p \leq .05$

Table 51
PHYSICIANS' ATTITUDES REGARDING UTILIZATION AND ADJUSTED RESOURCE USE RATES, OBSTETRICS/GYNECOLOGY†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Physicians Too Dependent on Aids/Consultations															
Agree	6.85	.687	8	1.62	.738	8	1.83	.873	8	13.81	.647	8	6.68	.227	8
Disagree	6.51		8	1.48		8	1.88		8	13.03		8	6.06		8
Could Use of Tests Be Reduced?															
Yes															
No	Only two responses in "no" category; did not compute.														

Table 52
LENGTH OF TIME IN GROUP, FORMAL AUTHORITY AND ADJUSTED RESOURCE USE RATES, OBSTETRICS/GYNECOLOGY†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Years with Kaiser-Permanente															
<6 years	7.79	.010	9*	1.68	.409	9	1.82	.731	9	15.03	.070	9	6.38	.918	9
6+ years	5.79		8	1.36		8	1.92		8	12.14		8	6.32		8
Corr. coeff.	r = -.447*			r = -.052			r = -.203			r = -.257			r = -.118		
Sig.	p = .036			p = .422			p = .218			p = .160			p = .326		
Held Administrative Office in Medical Group															
Yes	6.01	.557	3	1.80	.533	3	1.52	.212	3	13.60	.657	3	6.69	.312	3
No	6.73		10	1.42		10	1.96		10	12.67		10	6.11		10

†Not ascertained responses are excluded; the sum of n does not always equal 17.

* $p \leq .05$

Table 53
INFORMAL INFLUENCE, LEADERSHIP AND ADJUSTED RESOURCE USE RATES, INTERNAL MEDICINE†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admissio Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Close Friends in Group															
Most, many	5.36	.990	10	3.56	.168	10	3.19	.211	10	13.91	.886	10	1.29	.497	10
Few	5.36		19	3.10		19	3.56		19	13.77		19	1.14		19
Number of Times Consulted Per Month about Drug Therapy															
<5 times	4.97	.106	15	3.13	.405	15	3.38	.605	15	13.20	.123	15	1.07	.248	15
5+ times	5.83		15	3.39		15	3.53		15	14.61		15	1.30		15
Corr. coeff.	r = .098			r = .123			r = -.134			r = .058			r = .060		
Sig.	p = .303			p = .259			p = .240			p = .381			p = .377		
	r	p	n	r	p	n	r	p	n	r	p	n	r	p	n
Friendship Choices	.020	.459	30	.405	.013	30*	-.290	.060	30	.103	.295	30	-.094	.311	30
Most Respect Patient Relations	.038	.421	30	-.167	.189	30	.173	.180	30	.001	.498	30	-.235	.105	30
Most Likely Consult Drugs	.061	.375	30	.079	.339	30	-.063	.370	30	.001	.498	30	-.044	.409	30
Influence - How Things Run in Kaiser-Permanente	-.563	.001	30*	-.051	.394	30	.037	.423	30	-.388	.017	30*	.056	.385	30
Influence - How Things Run in Department	-.337	.034	30*	.190	.157	30	-.064	.368	30	-.189	.159	30	.274	.072	30
Respect Overall Leadership in Kaiser-Permanente	-.512	.002	30*	-.059	.378	30	-.036	.425	30	-.361	.025	30*	.107	.287	30
Respect Competence in Department	.158	.203	30	.125	.256	30	.017	.464	30	.101	.299	30	.015	.468	30
Respect Competence in Kaiser-Permanente	.174	.178	30	.180	.171	30	-.056	.387	30	.113	.275	30	-.058	.381	30
Most Outstanding Overall in Kaiser-Permanente	-.189	.159	30	.110	.281	30	-.124	.257	30	-.131	.245	30	.177	.174	30

†Not ascertained responses are excluded; the sum of n does not always equal 30.

* $p \leq .05$

Table 54
INFORMAL INFLUENCE, LEADERSHIP AND ADJUSTED RESOURCE USE RATES, PEDIATRICS†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Close Friends in Group															
Most, many	2.35	.407	12	1.02	.395	12	1.82	.108	12	5.74	.216	12	0.51	.854	12
Few	2.69		7	1.19		7	2.03		7	6.50		7	0.54		7
Number of Times Consulted Per Month about Drug Therapy															
<4 times	2.45	.903	10	1.06	.767	10	1.93	.592	10	6.03	.991	10	0.50	.716	10
4+ times	2.50		9	1.11		9	1.86		9	6.02		9	0.54		9
Corr. coeff.	r = −.083			r = −.094			r = −.201			r = −.072			r = −.029		
Sig.	p = .368			p = .351			p = .204			p = .385			p = .453		
	r	p	n	r	p	n	r	p	n	r	p	n	r	p	n
Friendship Choices	−.225	.171	20	−.177	.227	20	−.002	.497	20	−.201	.198	20	−.034	.443	20
Most Respect Patient Relations	.196	.204	20	.268	.127	20	.109	.324	20	.261	.133	20	.512	.010	20*
Most Likely Consult Drugs	.165	.243	20	.087	.358	20	−.328	.079	20	.124	.301	20	.285	.112	20
Influence - How Things Run in Kaiser-Permanente	.127	.297	20	.079	.370	20	.067	.390	20	.078	.373	20	.010	.483	20
Influence - How Things Run in Department	.029	.452	20	.117	.311	20	.055	.410	20	.011	.482	20	−.061	.399	20
Respect Overall Leadership in Kaiser-Permanente	.154	.258	20	.075	.377	20	.090	.353	20	.105	.330	20	.054	.411	20
Respect Competence in Department	.245	.149	20	.356	.061	20	−.316	.087	20	.203	.195	20	.303	.097	20
Respect Competence in Kaiser-Permanente	.312	.090	20	.068	.388	20	.073	.380	20	.247	.147	20	.264	.130	20
Most Outstanding Overall in Kaiser-Permanente	.243	.151	20	.059	.403	20	.136	.283	20	.188	.214	20	.186	.217	20

†Not ascertained responses are excluded; the sum of n does not always equal 20.

* $p < .05$

Table 55
INFORMAL INFLUENCE, LEADERSHIP AND ADJUSTED RESOURCE USE RATES, OBSTETRICS/GYNECOLOGY†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admissio Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Close Friends in Group															
Most, many	6.83	.964	8	1.49	.855	8	1.74	.399	8	13.21	.601	8	6.65	.248	8
Few	6.87		9	1.56		9	1.98		9	14.08		9	6.09		9
Number of Times Consulted Per Month about Drug Therapy															
<5 times	6.64	.359	7	1.19	.114	7	1.61	.147	7	12.79	.211	7	6.69	.444	7
5+ times	7.46		8	1.85		8	1.99		8	15.03		8	6.30		8
Corr. coeff.	r = .081			r = .255			r = .513*			r = .397			r = .166		
Sig.	p = .387			p = .180			p = .025			p = .071			p = .278		
	r	p	n	r	p	n	r	p	n	r	p	n	r	p	n
Friendship Choices	.109	.338	17	.565	.009	17*	-.282	.136	17	.346	.087	17	-.052	.422	17
Most Respect Patient Relations	.034	.449	17	.420	.047	17*	-.135	.303	17	.206	.214	17	-.051	.423	17
Most Likely Consult Drugs	.225	.192	17	.517	.017	17*	-.402	.055	17*	.357	.080	17	.148	.285	17
Influence - How Things Run in Kaiser-Permanente	.127	.313	17	.642	.003	17*	-.287	.132	17	.416	.048	17*	.095	.359	17
Influence - How Things Run in Department	.118	.327	17	.319	.106	17	-.355	.081	17	.224	.193	17	.450	.035	17*
Respect Overall Leadership in Kaiser-Permanente	.131	.309	17	.640	.003	17*	-.303	.118	17	.409	.051	17*	.131	.308	17
Respect Competence in Department	.251	.165	17	.497	.021	17*	-.351	.083	17	.374	.070	17	.123	.319	17
Respect Competence in Kaiser-Permanente	.111	.335	17	.617	.004	17*	-.320	.105	17	.382	.065	17	.021	.468	17
Most Outstanding Overall in Kaiser-Permanente	.128	.312	17	.640	.003	17*	-.246	.170	17	.435	.041	17*	.045	.432	17

†Not ascertained responses are excluded; the sum of n does not always equal 17.

* $p \leq .05$

Table 56
LOYALTY/COMMITMENT AND ADJUSTED RESOURCE USE RATES, INTERNAL MEDICINE†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Loyalty for Kaiser-Permanente in Oregon															
Loyal	4.95	.209	12	3.47	.269	12	3.40	.851	12	13.43	.493	12	1.26	.582	12
Neutral	5.66		17	3.11		17	3.45		17	14.09		17	1.14		17
Most in Common with Other Kaiser-Permanente or Your Specialty in Portland															
Other Kaiser-Permanente	4.42	.013	9*	3.46	.411	9	3.25	.333	9	12.62	.063	9	1.30	.434	9
Portland specialty	5.82		21	3.18		21	3.55		21	14.46		21	1.13		21
Would You Choose Kaiser-Permanente again?															
Definitely	3.96	.005	6*	2.80	.132	6	3.49	.902	6	11.82	.019	6*	1.12	.738	6
Probably, no	5.76		24	3.38		24	3.45		24	14.43		24	1.20		24

†Not ascertained responses are excluded; the sum of n does not always equal 30.

* $p \leq .05$

Table 57
LOYALTY/COMMITMENT AND ADJUSTED RESOURCE USE RATES, PEDIATRICS†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admissio Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Loyalty for Kaiser-Permanente in Oregon															
Loyal	2.48	.918	12	1.16	.381	12	1.89	.668	12	6.11	.736	12	0.54	.849	12
Neutral	2.53		6	0.98		6	1.83		6	5.89		6	0.51		6
Most in Common with Other Kaiser-Permanente or Your Specialty in Portland															
Other Kaiser-Permanente	Only one response in "other K-P" category; did not compute.														
Portland Specialty															
Would You Choose Kaiser-Permanente Again?															
Definitely	2.57	.640	9	1.20	.212	9	1.91	.860	9	6.27	.431	9	0.59	.258	9
Probably, no	2.39		10	0.98		10	1.88		10	5.80		10	0.45		10

†Not ascertained responses are excluded; the sum of n does not always equal 20.

* p ≤.05

Table 58
LOYALTY/COMMITMENT AND ADJUSTED RESOURCE USE RATES, OBSTETRICS/GYNECOLOGY†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Loyalty for Kaiser-Permanente in Oregon															
Loyal	6.50	.134	10	1.40	.245	10	1.64	.179	10	12.83	.170	10	6.70	.279	10
Neutral	8.04		4	1.99		4	2.04		4	15.74		4	6.06		4
Most in Common with Other Kaiser-Permanente or Your Specialty in Portland															
Other Kaiser-Permanente	7.88	.170	4	1.36	.822	4	1.68	.557	4	13.45	.999	4	6.36	.921	4
Portland specialty	6.40		11	1.46		11	1.89		11	13.45		11	6.42		11
Would You Choose Kaiser-Permanente Again?															
Definitely	Only two responses in "definitely" category; did not compute.														
Probably, no															

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†Not ascertained responses are excluded; the sum of n does not always equal 17.

* p $\leq$.05

Table 59
WORK-RELATED FACTORS AND ADJUSTED RESOURCE USE RATES, INTERNAL MEDICINE†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admissio Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Patient Load about Right?															
About right, see more	4.38	.102	4	3.02	.529	4	3.83	.330	4	13.18	.470	4	1.11	.844	4
Too high	5.65		25	3.31		25	3.43		25	14.15		25	1.17		25
Satisfied with Size, Manageability of Patient Load															
Satisfied	4.34	.014	8*	2.93	.195	8	3.53	.746	8	12.64	.093	8	1.22	.808	8
Dissatisfied	5.79		22	3.38		22	3.43		22	14.37		22	1.17		22
Compare Kaiser-Permanente to Traditional Practice: Stable Patient Relations															
Group makes easier, same	5.46	.773	20	3.37	.354	20	3.64	.053	20*	14.41	.120	20	1.22	.645	20
Group makes harder	5.29		10	3.06		10	3.08		10	12.90		10	1.12		10
Compare Kaiser-Permanente to Traditional Practice: Patients Seen Per Day															
Higher in group	5.88	.004	21*	3.47	.032	21*	3.37	.347	21	14.53	.035	21*	1.20	.823	21
Same, lower in group	4.28		9	2.77		9	3.66		9	12.46		9	1.15		9
Percent Patient Load Regular Doctor															
<66 %	5.30	.717	15	3.16	.497	15	3.12	.011	15*	13.41	.286	15	1.11	.452	15
66+%	5.50		15	3.37		15	3.80		15	14.40		15	1.26		15
Corr. coeff.	r = .139			r = .112			r = .493*			r = .259			r = .051		
Sig.	p = .231			p = .277			p = .003			p = .084			p = .394		
	r	p	n	r	p	n	r	p	n	r	p	n	r	p	n
Caseload	.011	.478	30	.101	.297	30	-.285	.064	30	-.018	.462	30	-.090	.318	30
Workload	-.307	.049	30*	-.075	.348	30	.211	.131	30	-.186	.163	30	-.517	.002	30*

†Not ascertained responses are excluded; the sum of n does not always equal 30.

* $p \leq .05$

Table 60
WORK-RELATED FACTORS AND ADJUSTED RESOURCE USE RATES, PEDIATRICS†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Patient Load about Right?															
About right, see more	2.61	.321	13	1.18	.112	13	1.92	.558	13	6.22	.321	13	0.55	.457	13
Too high	2.19		6	0.87		6	1.84		6	5.59		6	0.45		6
Satisfied with Size, Manageability of Patient Load															
Satisfied	2.54	.422	16	1.10	.677	16	1.90	.878	16	6.10	.539	16	0.50	.533	16
Dissatisfied	2.12		3	0.99		3	1.87		3	5.60		3	0.61		3
Compare Kaiser-Permanente to Traditional Practice: Stable Patient Relations															
Group makes easier, same	2.77	.147	9	1.15	.623	9	2.00	.027	9*	6.49	.110	9	0.49	.796	9
Group makes harder	2.19		9	1.05		9	1.74		9	5.51		9	0.52		9
Compare Kaiser-Permanente to Traditional Practice: Patients Seen Per Day															
Higher in group	Only two responses in "higher" category; did not compute.														
Same, lower in group															
Percent Patient Load Regular Doctor															
<66 %	2.70	.302	7	1.16	.522	7	1.95	.562	7	6.35	.355	7	0.71	.017	7*
66+%	2.27		11	1.03		11	1.86		11	5.76		11	0.42		11
Corr. coeff.	r = -.055			r = -.061			r = -.130			r = -.060			r = -.458*		
Sig.	p = .414			p = .406			p = .304			p = .407			p = .028		
	r	p	n	r	p	n	r	p	n	r	p	n	r	p	n
Caseload	.235	.160	20	.200	.199	20	-.074	.379	20	.110	.322	20	.101	.336	20
Workload	-.208	.190	20	.084	.363	20	.071	.382	20	-.135	.285	20	-.232	.163	20

†Not ascertained responses are excluded; the sum of n does not always equal 20.

* $p \leq .05$

Table 61
WORK-RELATED FACTORS AND ADJUSTED RESOURCE USE RATES, OBSTETRICS/GYNECOLOGY†

	Laboratory Rate ($)			Radiology Rate ($)			Drug Rate ($)			Total Rate ($)			Hospital Admission Rate x 100		
	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n	Ave.	p	n
Patient Load about Right?															
About right, see more	Only two responses in "about right, see more" category; did not compute.														
Too high															
Satisfied with Size, Managability of Patient Load															
Satisfied	6.87	.979	5	1.62	.766	5	2.09	.296	5	13.52	.907	5	6.45	.798	5
Dissatisfied	6.84		12	1.49		12	1.77		12	13.73		12	6.31		12
Compare Kaiser-Permanente to Traditional Practice: Stable Patient Relations															
Group makes easier, same	5.75	.066	6	1.43	.975	6	1.98	.437	6	12.70	.510	6	6.53	.711	6
Group makes harder	7.49		9	1.44		9	1.74		9	13.95		9	6.32		9
Compare Kaiser-Permanente to Traditional Practice: Patients Seen Per Day															
Higher in group	6.73	.538	14	1.29	.002	14*	1.91	.536	14	13.32	.365	14	6.39	.717	14
Same, lower in group	7.42		3	2.63		3	1.68		3	15.29		3	6.16		3
Percent Patient Load Regular Doctor															
<66 %	6.53	.388	10	1.21	.078	10	2.15	.007	10*	13.13	.464	10	6.03	.076	10
66+%	7.34		6	1.84		6	1.41		6	14.47		6	6.94		6
Corr. coeff.	r = .533*			r = .620*			r = −.524*			r = .395			r = .309		
Sig.	p = .017			p = .005			p = .019			p = .065			p = .122		
	r	p	n	r	p	n	r	p	n	r	p	n	r	p	n
Caseload	.032	.451	17	−.062	.406	17	.289	.130	17	−.001	.499	17	−.215	.204	17
Workload	−.081	.379	17	.061	.407	17	−.162	.267	17	−.304	.118	17	−.509	.018	17*

†Not ascertained responses are excluded; the sum of n does not always equal 17.
* p ≤.05

Table 62
MULTIPLE REGRESSION ANALYSIS OF ADJUSTED RESOURCE USE RATES FOR MEDICAL TRAINING/PROFESSIONAL FACTORS[#]

		INTERNAL MEDICINE					PEDIATRICS					OBSTETRICS/GYNECOLOGY				
		Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate
Years Since Graduation	b[†]	-.177	.055	.173	.057	.200	-.240	.032	-.183	-.264	.200	-.256	.245	.074	.106	.090
	p	.438	.813	.462	.793	.383	.316	.917	.544	.304	.475	.449	.467	.827	.742	.780
Medical School	b	.213	.165	.313	.409	.235						.201	.333	.218	.479	.170
	p	.372	.495	.210	.085	.327						.507	.279	.480	.114	.560
Teaching Medical School	b	.193	.263	-.076	.140	.215	.504	.042	.205	.433	.365					
	p	.405	.271	.749	.532	.357	.046*	.889	.490	.098	.196					
Percent Subspecialty Practice	b						.255	.100	-.154	.238	.194					
	p						.276	.735	.598	.338	.478					
Publish/Present Scientific Papers	b						.290	.284	.139	.259	-.133					
	p						.227	.355	.641	.309	.630					
Number Courses Attended	b											.138	-.093	.149	-.056	.338
	p											.668	.772	.648	.856	.282
Prior Practice Experience	b											.058	-.298	.036	-.018	-.120
	p											.834	.293	.899	.946	.653
	r^2	.153	.121	.096	.213	.151	.461	.094	.118	.383	.243	.132	.133	.105	.197	.199
	P	.382	.499	.602	.220	.388	.118	.881	.827	.218	.506	.714	.710	.799	.512	.505

[#] Pairwise deletion of missing cases; internal medicine n=30, pediatrics n=20, obstetrics-gynecology n=17.

[†] b = beta

*$p \leq .05$

Table 63

MULTIPLE REGRESSION ANALYSIS OF ADJUSTED RESOURCE USE RATES FOR STYLE/ORIENTATION TO MEDICINE[#]

		INTERNAL MEDICINE					PEDIATRICS					OBSTETRICS/GYNECOLOGY				
		Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate
Compared to Colleagues: Self-assessment, Conservatism	b[†]	.298	.257	-.060	.266	-.113	-.091	.194	-.463	-.155	-.301					
	p	.147	.232	.780	.190	.563	.738	.518	.097	.576	.281					
Antibacterial Treatment Infection - Males	b	-.001	-.148	.298	.140	.384										
	p	.996	.486	.172	.484	.058*										
Antibacterial Treatment Infection - Females	b						-.552	-.053	-.511	-.443	.021					
	p						.069	.862	.077	.137	.940					
Antibacterial treatment Infection - gonorrhea	b						-.250	-.519	.159	-.285	-.341					
	p						.350	.093	.527	.294	.210					
Antibacterial Treatment Infection - Tonsils	b											.197	.177	.000	.214	-.124
	p											.320	.391	.999	.296	.536
Social Orientation-Medicine	b	.165	.083	.172	.201	.113	-.191	-.001	.108	-.064	-.384					
	p	.397	.685	.409	.300	.550	.502	.997	.688	.821	.191					
Percent Patients Troublesome	b											-.141	.076	-.141	-.041	.135
	p											.451	.697	.488	.832	.475
Problem: Patient Overconcern Symptoms	b	-.274	-.220	.036	- .212	-.340						-.429	-.320	-.011	-.362	-.286
	p	.166	.290	.862	.278	.081						.037*	.127	.957	.083	.158
Problem: Patient Neurotic Personality	b						.283	.127	.301	.298	.263					
	p						.294	.660	.246	.276	.329					
	r^2	.227	.135	.113	.233	.266	.426	.307	.476	.413	.425	.176	.103	.020	.123	.154
	p	.188	.480	.578	.174	.116	.278	.525	.197	.302	.280	.177	.428	.918	.341	.234

[#] Pairwise deletion of missing cases; internal medicine n=30, pediatrics n=20, obstetrics-gynecology n=17.

[†] b = beta

[*] $p \leq .05$

Table 64

MULTIPLE REGRESSION ANALYSIS OF ADJUSTED RESOURCE USE RATES FOR ATTITUDES FOR MEDICAL BENEFITS AND UTILIZATION[#]

		INTERNAL MEDICINE					PEDIATRICS					OBSTETRICS/GYNECOLOGY				
		Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate
Does Class Coverage Influence Resources?	b[†]	.066	.197	.003	.178	-.129						.122	.184	-.030	.160	-.211
	p	.768	.336	.938	.416	.543						.547	.299	.878	.402	.292
Could Use of Tests Be Reduced?	b	.189	.364	.145	.197	-.310	.263	-.076	-.005	.122	.039					
	p	.397	.083	.519	.367	.152	.342	.786	.986	.665	.891					
Physicians Too Dependent on Aids/Consultations	b						.150	.303	.029	.178	-.202	.062	-.434	-.301	-.283	-.057
	p						.584	.286	.920	.530	.483	.759	.019*	.130	.145	.776
	r^2	.046	.203	.021	.086	.131	.119	.082	.001	.062	.037	.015	.257	.087	.125	.043
	p	.612	.092	.797	.388	.229	.411	.551	.995	.640	.769	.818	.021*	.305	.175	.568

[#] Pairwise deletion of missing cases; internal medicine n=30, pediatrics n=20, obstetrics-gynecology n=17.

[†] b = beta

*$p \leq .05$

Table 65

MULTIPLE REGRESSION ANALYSIS OF ADJUSTED RESOURCE USE RATES FOR ORGANIZATIONAL FACTORS[#]

		INTERNAL MEDICINE					PEDIATRICS					OBSTETRICS/GYNECOLOGY				
		Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate
Years with K-P	b[†]	-.006	-.082	-.000	-.010	-.025	-.505	-.021	-.334	-.497	.040	-.038	-.090	-.329	-.152	-.147
	p	.975	.693	.998	.964	.914	.053*	.947	.263	.091	.882	.892	.757	.242	.611	.619
Number of Close Friends	b						-.102	.145	.102	-.002	-.373	-.168	.101	.274	-.066	.152
	p						.634	.618	.694	.992	.136	.591	.758	.377	.842	.642
Friendship Choices	b	.106	.511	-.380	.219	-.121	-.454	-.276	.087	-.303	-.155					
	p	.611	.029*	.124	.349	.633	.115	.461	.793	.343	.611					
Respect Patient Relations	b	-.034	-.238	.203	-.057	-.223	.118	.070	.402	.277	.393	-.058	-.203	.195	-.014	-.240
	p	.845	.202	.312	.766	.289	.653	.845	.224	.368	.197	.820	.449	.440	.960	.376
Consult on Drugs	b						-.122	-.019	-.353	-.071	.130					
	p						.611	.954	.240	.796	.629					
nfluence How Thing un In Department	b											-.115	.351	.026	-.192	.272
	p											.793	.449	.952	.682	.558
verall Leadership	b	-.448	-.224	.112	-.344	.105										
	p	.020*	.256	.594	.099	.636										
espect Competence n Department	b						.076	.340	-.513	-.031	.083	.334	.368	.168	.297	.043
	p						.767	.337	.119	.917	.771	.357	.333	.634	.440	.909
espect Competence n Kaiser-Permanente	b	.027	-.009	.060	-.067	.084	.738	.164	.213	.524	.333					
	p	.899	.968	.805	.772	.742	.029*	.688	.563	.149	.332					
utstanding Overall	b											-.312	-.312	-.307	-.323	.055
	p											.438	.507	.489	.502	.906

Pairwise deletion of missing cases; internal medicine n=30, pediatrics n=20, obstetrics-gynecology n=17.

b = beta

≤ .05

Table 65 (Continued)
MULTIPLE REGRESSION ANALYSIS OF ADJUSTED RESOURCE USE RATES FOR ORGANIZATIONAL FACTORS#

		INTERNAL MEDICINE					PEDIATRICS					OBSTETRICS/GYNECOLOGY				
		Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate
Held Administrative Office In Group	b†											.130	-.027	-.486	-.299	-.088
	p											.724	.944	.191	.449	.820
Loyal to Other K-P or Portland Specialty	b	.320	-.236	.188	.263	-.125										
	p	.099	.247	.389	.216	.584										
Loyalty for K-P In Oregon	b											.159	-.242	-.131	.030	-.072
	p											.528	.365	.597	.991	.786
	r^2	.379	.291	.172	.231	.087	.579	.221	.378	.443	.476	.230	.155	.253	.121	.149
	p	.065	.200	.581	.366	.892	.122	.853	.505	.355	.288	.795	.934	.738	.970	.942

Pairwise deletion of missing cases; internal medicine n=30, pediatrics n=20, obstetrics-gynecology n=17.

† b = beta

*$p \leq .05$

Table 66

MULTIPLE REGRESSION ANALYSIS OF ADJUSTED RESOURCE USE RATES FOR WORK-RELATED FACTORS#

		INTERNAL MEDICINE					PEDIATRICS					OBSTETRICS/GYNECOLOGY				
		Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate
Patient Load Right	b†						-.006	-.225	.125	.007	-.156	.376	.187	-.135	.221	.052
	p						.985	.524	.680	.984	.643	.041*	.346	.443	.240	.772
Compare K-P: Stable Patient Relations	b	-.093	.275	.239	.207	.150	.493	.302	.663	.590	.142					
	p	.580	.160	.218	.274	.401	.109	.344	.029*	.059	.638					
Compare K-P: Number Patients Seen Per Day	b	-.536	-.401	.030	-.480	.148										
	p	.003*	.061	.885	.024*	.444										
Percent Patient Load Regular Doctor	b						-.035	-.073	-.380	-.120	-.415	.458	.437	.502	.590	.088
	p						.910	.827	.202	.693	.208	.076	.126	.052*	.033*	.728
Caseload	b	-.108	.001	-.316	-.127	.029	.294	.177	.008	.178	-.000	.404	.437	.029	.443	.053
	p	.524	.996	.109	.502	.871	.301	.559	.976	.520	.999	.118	.128	.906	.104	.836
Workload	b	-.040	-.006	.174	-.048	-.623	-.338	-.074	.058	-.265	-.190	-.365	-.137	.213	-.247	-.524
	p	.828	.976	.407	.816	.003*	.316	.835	.850	.423	.579	.048*	.490	.232	.192	.007*
	r^2	.381	.193	.201	.235	.308	.302	.186	.393	.318	.255	.297	.126	.309	.221	.273
	p	.014*	.233	.214	.138	.048*	.486	.769	.289	.448	.602	.067	.497	.056*	.182	.094

Pairwise deletion of missing cases; internal medicine n=30, pediatrics n=20, obstetrics-gynecology n=17.

† b = beta

*p ≤ .05

Table 67

MULTIPLE REGRESSION ANALYSIS FOR ADJUSTED RESOURCE USE RATES COMBINING INDEPENDENT VARIABLES FROM ALL CATEGORIES, INTERNAL MEDICINE[#]

		Forced Entry Method					Stepwise Method				
		Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate
Compare K-P: Number of Patients Seen	b[†]	-.391	-.254		-.248		-.596				
	p	.025*	.182		.229		.001*				
Overall Leadership	b	-.299			-.192						
	p	.067			.333						
Compare: Other K-P vs. Portland Specialty	b	.208									
	p	.194									
Could Use of Tests Be Reduced?	b		.339					.408			
	p		.075					.043*			
Friendship Choices	b		.274								
	p		.158								
Medical school	b				.313					.436	
	p				.111					.023*	
Workload	b					-.405					
	p					.034*					
Antibacterial Treatment Infection - Males	b					.295					
	p					.074					
Problem: Patient Overconcern Symptoms	b					-.160					
	p					.383					
How Things Run: K-P	b										
	p										
	r^2	.478	.338		.312	.364	.355	.166		.190	
	p	.001*	.031*		.038*	.008*	.001*	.043*		.023*	

[#] Pairwise deletion of missing cases; internal medicine n=30, pediatrics n=20, obstetrics-gynecology n=17.

[†] b = beta

*$p \leq .05$

Table 68
MULTIPLE REGRESSION ANALYSIS FOR ADJUSTED RESOURCE USE RATES COMBINING INDEPENDENT VARIABLES FROM ALL CATEGORIES, PEDIATRICS[#]

		Forced Entry Method					Stepwise Method				
		Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate
Respect Competence in Group	b[†]	.343					.420				
	p	.095					.044*				
Antibacterial Treatment for Infection - Females	b	-.498		-.454			-.585				
	p	.023*		.061			.008*				
Teaching Medical School Now	b	.375			.303						
	p	.066			.189						
Compare K-P: Stable Patient Relations	b	.112		.374	.385						
	p	.541		.108	.097						
Years with K-P	b	-.265			-.300						
	p	.198			.194						
Compare to Colleagues: Self-assessment, Conservatism	b			-.310							
	p			.192							
Friendship Choices	b										
	p										
	r^2	.690		.470	.403		.428				
	p	.013*		.036*	.074		.012*				

[#] Pairwise deletion of missing cases; internal medicine n=30, pediatrics n=20, obstetrics-gynecology n=17.

[†] b = beta

[*] $p \leq .05$

Table 69
MULTIPLE REGRESSION ANALYSIS FOR ADJUSTED RESOURCE USE RATES COMBINING INDEPENDENT VARIABLES FROM ALL CATEGORIES, OBSTETRICS/GYNECOLOGY#

		Forced Entry Method					Stepwise Method				
		Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate	Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate
Percent Patient Load Regular Doctor	b†	.437			.403						
	p	.050*			.401						
Workload	b	-.251									
	p	.223									
Problem: Patient Over-concern Symptoms	b	-.520	-.530		-.450						
	p	.023*	.046*		.326						
Physicians Too Dependent on Aids/Consultations	b		.123								
	p		.618								
Caseload	b				.140						
	p				.721						
Medical School	b				-.167						
	p				.752						
Friendship Choices	b							.565			
	p							.023*			
	r^2	.566	.273		.313			.319			
	p	.016*	.126		.629			.023*			

Pairwise deletion of missing cases; internal medicine n=30, pediatrics n=20, obstetrics-gynecology n=17.

b = beta

$p \leq .05$

Table 70

WEIGHTED STEPWISE MULTIPLE REGRESSION ANALYSIS FOR ADJUSTED RESOURCE USE RATES COMBINING INDEPENDENT VARIABLES FROM ALL CATEGORIES, INTERNAL MEDICINE[#]

		Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate
Compare K-P: Number of Patients Seen	b[†]					
	p					
Overall Leadership	b					
	p					
Compare: Other K-P vs. Portland Specialty	b	.514				
	p	<.001*				
Could Use of Tests Be Reduced?	b	.393	.456			
	p	<.001*	<.025*			
Friendship Choices	b		.423			
	p		<.025*			
Medical School	b				.496	
	p				<.025*	
Workload	b			.506		
	p			<.025*		
Antibacterial Treatment Infection - Males	b					
	p					
Problem: Patient Overconcern Symptoms	b					
	p					
How Things Run: K-P	b	-.423				
	p	<.001*				
	r^2	.808	.500	.256	.246	
	p	<.001*	<.005*	<.025*	<.025*	

[#] Casewise deletion of missing cases; n=22.

[†] b = beta

* p = $\leq$.05

Table 71

WEIGHTED STEPWISE MULTIPLE REGRESSION ANALYSIS FOR ADJUSTED RESOURCE USE RATES COMBINING INDEPENDENT VARIABLES FROM ALL CATEGORIES, PEDIATRICS[#]

		Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate
Respect Competence in Group						
	b[†]					
	p					
Antibacterial Treatment for Infection - Females						
	b			-.706	-.519	
	p			<.005	<.050*	
Teaching Medical School Now						
	b					
	p					
Compare K-P: Stable Patient Relations						
	b					
	p					
Years with K-P						
	b	-.604				
	p	<.025*				
Friendship Choices						
	b					
	p					
Compared to Colleagues: Self-assessment, Conservatism						
	b					
	p					
	r^2	.365		.449	.269	
	p	<.025*		<.005*	<.050*	

[#] Casewise deletion of missing cases; n=16.
[†] b = beta
* p = $\leq$.05

Table 72

WEIGHTED STEPWISE MULTIPLE REGRESSION ANALYSIS FOR ADJUSTED RESOURCE USE RATES COMBINING INDEPENDENT VARIABLES FROM ALL CATEGORIES, OBSTETRICS/GYNECOLOGY[#]

		Laboratory Rate	Radiology Rate	Drug Rate	Total Rate	Hospital Admission Rate
Percent Patient Load Regular Doctor	b[†]	.936	.828	−.686		
	p	<.001*	<.005*	<.050*		
Workload	b					
	p					
Problem: Patient Overconcern Symptoms	b					
	p					
Physicians Too Dependent on Aids/Consultations	b					
	p					
Caseload	b	.312				
	p	<.100				
Medical School	b					
	p					
Friendship Choices	b					
	p					
	r^2	.885	.686	.471		
	p	<.005*	<.005*	<.050*		

#Casewise deletion of missing cases; n=10.

† b = beta

* p = ≤.05

APPENDIX I

Characteristics of Respondents and Nonrespondents, Physicians Survey

Table 1

PHYSICIANS SURVEY RESPONDENTS AND NONRESPONDENTS BY AGE*

Age	Respondents		Nonrespondents	
	n	percent	n	percent
<40 years	62	43.7	7	19.4
40-49 years	48	33.8	18	50.0
50+ years	32	22.5	11	30.6
TOTAL	142	100.0%	36	100.0%

chi square = 7.142 p = .028

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*Not ascertained responses are excluded.

Table 2

PHYSICIANS SURVEY
RESPONDENTS AND NONRESPONDENTS BY SEX

	Respondents		Nonrespondents	
Sex	n	percent	n	percent
Male	135	94.4	35	97.2
Female	8	5.6	1	2.8
TOTAL	143	100.0%	36	100.0%

chi square = .070 p = .791

Table 3

PHYSICIANS SURVEY
RESPONDENTS AND NONRESPONDENTS BY SPECIALTY*

Specialty	Respondents		Nonrespondents	
	n	percent	n	percent
Medicine	35	42.7	14	51.9
Pediatrics	22	26.8	5	18.5
Obstetrics-Gynecology	16	19.5	1	3.7
General Surgery	9	11.0	7	25.9
TOTAL	82	100.0%	27	100.0%

chi square = 7.294 p = .063

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*Only those physicians in medicine, pediatrics, obstetrics-gynecology, and general surgery are included.

Table 4

PHYSICIANS SURVEY
RESPONDENTS AND NONRESPONDENTS BY LOCATION OF MEDICAL SCHOOL

Location of Medical School	Respondents n	Respondents percent	Nonrespondents n	Nonrespondents percent
Oregon	19	13.3	3	8.3
Other U.S.A.	95	66.4	27	75.0
Canada	4	2.8	0	0.0
Foreign	25	17.5	6	16.7
TOTAL	143	100.0%	36	100.0%

chi square = 1.902

p = .593

Table 5

PHYSICIANS SURVEY
RESPONDENTS AND NONRESPONDENTS BY COUNTY AMA MEMBERSHIP*

AMA Membership	Respondents		Nonrespondents	
	n	percent	n	percent
Not mentioned	55	43.3	18	56.2
Mentioned	72	56.7	14	43.8
TOTAL	127	100.0%	32	100.0%

chi square = 1.242 p = .265

---

*Not ascertained responses are excluded.

Table 6

PHYSICIANS SURVEY
RESPONDENTS AND NONRESPONDENTS BY BOARD CERTIFICATION*

Board Certification	Respondents n	Respondents percent	Nonrespondents n	Nonrespondents percent
Board certified	119	85.6	27	75.0
Board eligible	10	7.2	7	19.4
Not eligible or certified	10	7.2	2	5.6
TOTAL	139	100.0%	36	100.0%

chi square = 4.915 p = .086

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*Not ascertained responses are excluded.

APPENDIX II

Drug RVS

DEVELOPMENT AND IMPLEMENTATION OF THE HEALTH SERVICES RESEARCH CENTER (HSRC) DRUG RVS (RELATIVE VALUE SYSTEM)*

by

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DEVELOPMENT AND IMPLEMENTATION OF THE HEALTH SERVICES RESEARCH CENTER (HSRC) DRUG RVS

This paper describes the development and implementation of a relative value system (RVS) to estimate the costs of prescription drug utilization by members of the Kaiser-Permanente Medical Care Program (KPMCP) - Oregon Region. The relative values for drugs are based on 1982 dollar charges for prescriptions dispensed by the Oregon Kaiser-Permanente Medical Care Program (KPMCP) outpatient pharmacies. The total number of drug relative value units for each year from 1972 through 1980 was estimated and total outpatient pharmacy costs was divided by the total number of drug relative value units to produce an estimate of the dollar cost of producing a drug relative value unit for each year. The resulting drug RVS, in conjunction with the outpatient utilization data, relative values and costs of production available for outpatient medical, surgical, laboratory, and radiology services, makes it possible for users of HSRC data systems to estimate total treatment costs of outpatient care based upon various units of analysis(e.g. year,contact for care,episode, etc.) .

This paper describes the data base, the assumptions, and the methods used to create the drug RVS, and identifies the strengths and weaknesses of the system. Dollar costs per drug RVS unit are derived, and the trends in total and unit costs of production are discussed.

I. DATA BASE FOR THE DRUG RVS

The data base consists of all direct and indirect contacts for care by a 5 percent random sample of KPMCP members from September 1966 to date. This computerized file includes basic membership demographics such as sex and age as of each contact for care, the identification of the provider, the place and type of services, morbidities, and medical, surgical, laboratory, and radiology services rendered, and beginning in 1972, the drugs ordered in the ambulatory medical record.

The drug data recorded include the name of the drug ordered and if noted, the strength and the dosage form of the drug(s). Close examination of the drug order data entered in the outpatient medical record has shown that the name of the prescription drug for the initial treatment of a morbidity is generally entered on the medical record (more than 90 percent of the time). Also, most of the time, the strength and dosage form of the drug are entered. However, the quantities ordered, directions for use, refill instructions, and records of refill prescriptions are not reliably entered. The medical record is not utilized as a source of refill information since the original prescription order form written by the provider contains the number of allowable refills. Over-the-counter drug orders (nonprescription drugs) are not frequently found in the medical record. Thus, drug order data are most reliable as measures of prescription drug utilization in acute conditions where drug therapy generally consists of a new or initial prescription order at the time of the contact for care. Drug order data are the least reliable measures of drug utilization for conditions of a chronic nature that require multiple refills of an initial order or for conditions which may be treated largely with nonprescription drugs.

II. METHOD OF CREATION OF THE DRUG RVS

Initially, a frequency distribution of all drug orders for members of the five percent sample during 1977 was obtained from the computer file. The year 1977 was chosen since it represents a midpoint of the years for which drug data are available and since 1977 drug data were also required for another research effort of the HSRC.

There were more than 3000 different drugs by name, strength and dosage form that were ordered during the year. These drug orders were sorted into one of 25 different therapeutic classes. Frequently-occurring drugs were to be assigned a specific relative value in units based on the usual KPMCP prescription charge for the most common quantity prescribed. Since many drugs were not ordered frequently, these drugs were to receive a relative value in units based on the weighted average of the prescription charges for the commonly-ordered drugs in that therapeutic class. Information routinely maintained about each drug code allows the sorting of drug orders into three groups: immunizations, parenteral drugs other than immunizations, and oral/topical drugs. Separate relative values were established for the drugs in each of these groups. These groups were established since immunizations and parenterals are administered in single doses while oral/topical drugs are dispensed in multiple doses. In addition, immunizations and parenterals are separated as the former reflects preventive treatment and the latter therapeutic treatment.

The next step was to list all specific drugs that were ordered 10 or more times in 1977 by the specific therapeutic class they represented. The list of oral/topical drugs was reviewed by KPMCP pharmacists to determine the prescription charges for the most-frequently dispensed quantities of these drugs provided as outpatient prescriptions, as of mid-1982. Pharmacists were aided in this process since frequently dispensed quantities of frequently ordered drugs are prepackaged by KPMCP pharmacies.

For each frequently-occurring oral and topical drug code, KPMCP pharmacists calculated the mid-1982 prescription charge for the most common prescription size. About 300 different drugs were priced individually; these accounted for 88 percent of all oral and topical drug orders in 1977. A weighted mean prescription charge was computed for each therapeutic class, based upon the orders for these frequently ordered drugs within the class. The drugs which were not individually priced by pharmacists were assigned the weighted mean prescription charge of the therapeutic class to which they belonged. A weighted mean prescription charge was then calculated for all oral and topical drug orders. This mean charge was applied to the few oral and topical drug codes in the therapeutic classes with very few orders for individual drugs and very few orders for the class.

Each drug was assigned a unique code to identify the drug by name if the strength and/or dosage form of the drug was not entered in the medical record. For example, the drug code 18851 was used to identify

Diazepam while the code 18856 was used to identify Diazepam tablets, 2 mg., and the code 18857 was used to identify Diazepam tablets, 5 mg. If the drug order entered in the medical record did not specify the strength or dosage form of the drug, the the order was assigned the RVS value of the most frequently occurring order for the drug. The rationale for this assignment being that the drug ordered by name is likely to be the most frequently ordered drug product with that name.

The mean prescription charge for oral and topical drug orders became the basic value for the drug RVS and was given a relative value of 1.0 unit. The prescription charges assigned to all oral and topical drug codes were divided by the mean charge to obtain drug RVS units for each drug code.

The second type of drug orders, immunizations, are coded as medical procedures and have a medical RVS value. Since the drug and labor costs for these procedures are included in the outpatient medical RVS, they were given a drug RVS value of zero.

Parenteral drugs other than immunizations (primarily antibiotics, cancer chemotherapy, steroids, and vitamins) were priced by a different method, since they are almost all administered in individual doses in the injection rooms of the KPMCP outpatient medical offices. Parenteral drugs are assigned a relative value reflecting the charge for administering the drug and this relative value is part of the outpatient medical RVS. However, the cost of the drug is not included in this charge. To derive costs for these parenteral drugs, those with 10 or more occurrences were given a 1982 wholesale cost per usual dose and strength. The wholesale cost was obtained from the 1982 Blue Book. The frequently occurring injections accounted for 85 percent of the parenteral drugs dispensed by the KPMCP pharmacies in 1977. A weighted mean cost per dose was calculated for each therapeutic class, using the frequently occurring parenteral drugs in that class. This mean cost was applied to all the drug orders for the remaining parenteral drugs in the therapeutic class. Relative value in units for parenteral drugs were obtained by dividing the cost per injection by the mean prescription charge for oral and topical drugs. The total RVS units for parenteral therapy has two components, the cost of the drugs and the service charges for administering it. This is essentially the same pricing method that is used by KPMCP pharmacies to establish the prescription charges for oral and topical drugs.

All relative values were rounded to the nearest tenth of a unit. These relative values for each drug code were assigned to all drugs ordered for the years 1972 through 1980. Drug codes that did not have a relative value assigned because of their infrequent occurrences were given the relative value of the therapeutic class of drugs to which they belonged. This value reflects their value relative to other therapeutic classes of drugs but since they occurred so infrequently, it was decided that assigning them a value reflective of the therapeutic class of drugs to which they belonged would not distort the total value of the drugs in that class. Also, as new drugs have appeared relative values have been assigned to the drug by the process just described, so that the drug RVS is continuously updated.

III. ATTACHING DOLLAR COSTS TO ANNUAL DRUG RVS UNITS

To use the drug RVS as part of a system to measure annual or total outpatient costs, the relative value units for drug orders had to be converted into dollars.

The total direct and indirect costs of KPMCP outpatient pharmacy operations for each year 1972 through 1980 were obtained from the KPMCP Financial Department. These costs include personnel costs, overhead costs, drug costs, and inventory costs. The costs of immunizations and the service charges for administering parenteral drugs appear as part of outpatient medical office operations costs.

The cost of production per drug RVS unit was calculated for each year by these steps:

1) The total number of drug RVS units from the drug orders of the five percent sample was calculated. This was multiplied by 20 to yield an estimate of the total number of drug RVS units ordered in the KPMCP.

2) Outpatient pharmacy costs were divided by the total number of drug RVS units, to yield a dollar cost to the KPMCP of producing a drug RVS unit.

Each annual dollar cost represents the dollar costs assigned 1.0 drug RVS units that year. Outpatient drug costs per specific drug, provider, person person or groups of persons is the sum of the total number of drug RVS units times the dollar cost per drug RVS unit. These dollar costs added to dollar costs of production for medical, surgical, laboratory, and radiology RVS units to allow an estimate of total outpatient care costs for any year after 1972 and for any other defined episode or unit of care.

Table 1 shows the results of the analysis of costs of production of drugs for the 1972-1980 period. Outpatient pharmacy costs increased from $2,268,815 to $5,256,985, an increase of 232 percent. The number of drug orders for outpatient care(excluding immunizations) of the KPMCP membership increased 39 percent, from 497,180 in 1972 to 692,200 in 1980. Drug RVS units produced increased from 436,970 to 705,594, a 61 percent increase. The mean annual number of drug orders per member changed little over time while the number of RVS units per drug order increased 16 percent, from 0.88 in 1972 to 1.02 in 1980. The dollar cost per drug RVS unit increased 44 percent, from $5.19 in 1972 to $7.45 in 1980.

Division of the dollars per drug RVS unit by the Bureau of Labor Statistics' consumer price index for prescription drugs allowed computation of the cost per drug RVS unit in real dollars, dollars of 1977 purchasing power. The real cost per drug RVS unit did not appear to change much from 1972 to 1980. However, in attempting to further interpret the data in Table 1, the following caution needs to be recognized.

Outpatient pharmacy costs reflect the total number of prescriptions dispensed, both new and refill, in any year by KPMCP pharmacies. It is estimated that about 75 percent of the prescriptions written for KPMCP members are dispensed at KPMCP pharmacies and that this percentage is increasing as more KPMCP members are enrolled with a prepaid prescription benefit. Drug RVS units are the result of drug orders entered by providers in the outpatient chart. These orders reliably indicate initial orders for prescription drugs but do not reliably include orders for refills or nonprescription drugs ordered by a provider. Since refill prescription comprise about 25 percent of all the prescriptions dispensed by KPMCP pharmacy and nonprescription drugs are infrequently ordered by prescription, the estimates of outpatient pharmacy costs and drug orders appear to be based upon similar numbers of observations but with some variability in the sample of the universe they purport to represent. Since the mean charge for all refill prescriptions is slightly higher than the mean charge for all original prescriptions, the dollar cost per drug RVS unit may be slightly overestimated. If the share of prescription refills changed substantially over time, this could further distort the measured dollar cost per drug RVS unit produced. However, the proportion of refill prescriptions of total prescription dispensed annually in the KPMCP has remained basically constant during this time period.

IV. THE VALIDITY OF THE DRUG RVS AND ESTIMATES OF DRUG COSTS

The basic validity of the drug RVS was examined by comparing the estimated mean charge per drug order(excluding immunizations) with the mean prescription charge by KPMCP pharmacies and the mean prescription charge by a national sample of community pharmacies nationwide for the years 1974 through 1980. Table 2 includes both the absolute dollar values and an index of charges using 1977 as the base year.

The table indicates that the mean drug order charge was very close to the KPMCP pharmacies mean prescription charge in the base year and was also very close in the years 1974-1976. Beginning in 1978, the mean charge per drug order increased more rapidly than the KPMCP pharmacies mean prescription charge. The mean charge per drug order also compares very favorably with the national data for the years 1976 through 1980.

The pattern described is also illustrated by the indices. These data also show that the charge per drug order has had a greater absolute and relative increase over these years than the mean prescription charges for KPMCP and community pharmacies. However, it does appear that the drug RVS provides reasonable estimates of prescription charges in general, for each year. The mean prescription charges derived from drug order data may be somewhat overestimated in the more recent years.

It is recognized that the imprecision is in part attributable to the nature of drug order data upon which the Drug RVS is based. The inability to more accurately identify the specific drug ordered, the quantities per prescription and the length of treatment(refills) per order all contribute to the imprecision.

Some of the imprecision could also result from changing prescribing patterns of physicians. If physicians change their frequency of prescribing specific drugs over time, this could influence the mean prescription charges per therapeutic class and the overall mean prescription charge derived from drug orders, particularly if these shifts involved drugs with substantially different unit costs. There is no reason to believe that from one year to the next large shifts occurred among drugs with substantially different costs. This is a more important factor if for example, 1972 drug order cost data were compared with 1980 drug order cost data.

The estimates of outpatient oral/topical drug costs per year or other unit are underestimated to the extent that orders for prescriptions refills are not entered into the outpatient medical record. These costs are also underestimated to the extent that members have oral/topical drug prescriptions dispensed at other than KPMCP pharmacies and to the extent that patients initiate use of nonprescription drugs for various morbidities and conditions. Thus, the estimates of outpatient oral/topical drug costs are reflective of total outpatient drug costs to the KPMCP.

Information maintained by the KPMCP indicates that per member prescription utilization is substantially higher for the members with a prepaid prescription drug benefit. This means the most reliable estimates of total oral/topical drug costs would be found among KPMCP members that have a prepaid drug benefit. The estimates of parenteral drug treatmet and immunizations should be reliable as both types of drugs are ordered and administered within the KPMCP.

V. FACTORS CONTRIBUTING TO INCREASED PHARMACY COSTS FROM 1972 TO 1980

Table 2 describes how changes in KPMCP membership, drug orders per member, RVS units per drug order, and the consumer price level for prescription drugs contributed to the increase in outpatient pharmacy costs after 1972.

The findings suggest that inflation of drug prices alone would have increased outpatient pharmacy operations costs by one-half from 1972 to 1980. Increases in KPMCP membership would have alone increased costs of operations by 41 percent. Increases in relative value units per drug order alone would have increased costs of operations 18 percent. On the other hand, the number of drug orders per member appeared to decreased slightly. If this factor had been the only change affecting pharmacy costs between 1972 and 1980, pharmacy costs would have declined two percent. Other factors, a residual not attributable to changes in membership, drug orders per member, RVS units per drug order, or the drug consumer price index, would have contributed a seven percent decrease in outpatient pharmacy costs from 1972 through 1980, if this factor had been the only change affecting the pharmacy during this period.

Table 2 was derived in this manner:

The model used to describe each year's total outpatient pharmacy costs was:

$$\text{total pharmacy costs} = \text{KPMCP membership} \times \text{drug orders per member} \times \text{RVS units per drug order} \times \text{dollar costs per drug RVS unit in 1977} \times \text{consumer price index for drugs (1977=1.0)} \times \text{real price index, 1977=1.0 (residual factor)}$$

All factors in this equation vary for each year, except for dollar cost per drug RVS unit in 1977, which is a constant. The drug price index for each year is divided by the 1977 price index level, so that 1977 prices are set equal to 1. The real price index was equal to the cost per relative value unit, divided by that year's drug consumer price index. To set this variable equal to 1 in 1977, each year's real drug unit value was divided by the 1977 real drug RVS unit value.

Since this is a multiplicative model, the log of total costs for each year equals the sum of the logs of the factors on the right half of the equation. Thus, the difference in the log of total outpatient pharmacy costs for 1972 and 1980 (0.85) equals the sum of the differences of the 1972 and 1980 logs of the factors on the right half of the equation.

To estimate the proportion of the change in outpatient phamacy costs that was due to membership changes, the log of the 1970 membership was subtracted from the log of the 1980 membership, with a 0.35 change in the log of membership. This was divided by 0.85, the change in the log of total dollar costs, to yield the estimate of 41 percent.

To estimate the proportion of the change in pharmacy costs that was due to changes in the number of drug orders per member, the 1972 log of the number of drug orders per member was subtracted from the 1980 log of the number of drug orders per member. The difference, -0.02, was divided by 0.85, to yield the estimate of -2.0 percent. A similar computation process was used for each of the remaining variables in the model.

It had been suggested that the assignment of importance to these variables in accounting for 1972-1980 cost increases was biased by the inclusion of potentially high drug resource user Medicare members into the KPMCP in 1980. To test this, the model was rerun for 1972 and 1979. It was found that drug consumer price increases were associated with approximately 45 percent of the cost increase over the period, and membership increases would have accounted for approximately 41 percent of the increases in costs. Increases in drug RVS units per member appeared to account for 15 percent of the 1972-1979 cost increase. Drug orders per member decreased slightly, and would have been consistent with a 4 percent decrease in costs. The real price index, or residual factor, was associated with three percent of the

1972-1979 cost increase. Thus, the 1972-1979 and the 1972-1980 results of applying this model for explaining total costs were very similar.

VI. IMPLICATIONS

This method of attempting to estimate outpatients drug costs appears to generate reasonable estimates of mean prescription charges for the members of the KPMCP from year to year. The method appears to underestimate somewhat the total outpatient drug costs of KPMCP members whatever the basis. The method provides the most reliable estimates of total outpatient drug costs in acute diseases and among members with a prepaid prescription drug benefit.

These limitations should not invalidate the use of this method to estimate outpatient drug costs but they should be mentioned whenever drug costs are estimated by this method. These estimates of drug costs should not be used for across medical care system comparisons but are most useful for within KPMCP outpatient drug cost analyes.

The imprecision of the drug RVS to assign relative values to drugs and the the underestimates of drug utilization can be reduced. In the former instance, the imprecision could be reduced by an extension of the method used to create the current drug RVS. Drug order frequencies would be obtained separately for each year from 1972 through 1980 and these annual frequency distributions would be aggregated. Any drug code which occurred frequently in any one year or over the entire period would get an individually-assigned prescription charge. The 1972-1980 aggregated frequencies would be used to obtain the weighted average therapeutic class prices, based on the drugs in each class which had been individually priced. More drugs would have relative values specific to them rather than based on a therapeutic class average. The therapeutic class averages would be based on drug prescribing patterns for the whole 1972-1980 period, rather than on 1977 patterns. Such an extension and revision of the current drug RVS would be labor-intensive and would involve most of the assumptions that underly the current approach., It would reduce gaps in the data that limit the precision of the current version of the drug RVS. It would not however, deal with the underestimates of outpatient drug costs from missing utilization data.

The limitations of the current Drug RVS cannot be eliminated using drug order data abstracted from the medical record. The ultimate way to resolve the problem is a computerized prescription information system. Such a system would provide complete data on initial and refill drug orders -- the number of each type of prescription filled, the quantity of each prescription, the strength of the drug, the dosage form, and the costs of the drug for all KPMCP members. Data would also be available on nonprescription drugs obtained through any KPMCP pharmacy.

The analysis of factors that have contributed to the increased costs of outpatient pharmacy operation suggest that neither per capita use of drugs nor increased intensity of drug treatment have been major contributors to increased costs. If these data are valid, they are contrary to the experience of the population- at-large which has had increased per capita use of drugs and a substantial increase in the intensity of drug treatment over the years. One possible explanation is the application of both formal and informal controls on drug selection and drug utilization by the KPMCP.

TABLE 1

DRUG RVS PRODUCTION AND COSTS IN THE KPMCP, 1972-1980

YEAR	OUTPATIENT PHARMACY COSTS	TOTAL DRUG ORDERS	TOTAL DRUG RVS UNIT PRODUCTION	HEALTH PLAN MEMBERSHIP	DRUG ORDERS PER MEMBER
1972	$2,268,815	497,180	436,970	168,084	2.96
1973	$2,785,653	552,760	499,072	181,298	3.05
1974	$2,421,192	598,660	543,220	190,273	3.15
1975	$2,700,515	584,540	542,258	194,508	3.01
1976	$3,245,252	569,260	524,094	195,517	2.91
1977	$3,613,428	640,580	601,908	205,104	3.12
1978	$4,234,977	655,000	624,156	217,694	3.01
1979	$4,745,019	655,960	640,832	227,981	2.88
1980	$5,256,985	692,200	705,594	237,960	2.91

TABLE 1 CONT.

RVS UNITS PER DRUG ORDER	DOLLARS PER DRUG RVS UNIT	DRUG PRICE INDEX (1977=1.00)	1977 DOLLARS PER DRUG RVS UNIT	DRUG RVS UNIT REAL PRICE INDEX (1977=1)
0.88	$5.19	0.83	$6.25	1.04
0.90	$5.58	0.82	$6.80	1.13
0.91	$4.46	0.84	$5.31	0.88
0.93	$4.98	0.90	$5.53	0.93
0.92	$6.19	0.94	$6.59	1.10
0.94	$6.00	1.00	$6.00	1.00
0.95	$6.79	1.08	$6.29	1.05
0.98	$7.40	1.16	$6.38	1.06
1.02	$7.45	1.27	$5.87	0.98

TABLE 2

COMPARING MEAN PRESCRIPTION CHARGES

YEAR	KPMCP PHARMACY PRESCRIPTION DATA	HSRC DRUG ORDER DATA	LILLY DIGEST DATA
1974	$4.17	$4.04	$4.81
1975	$4.72	$4.62	$5.18
1976	$5.48	$5.70	$5.66
1977	$5.72	$5.64	$6.10
1978	$6.06	$6.47	$6.57
1979	$6.49	$7.23	$7.15
1980	$7.27	$7.59	$7.85

TABLE 2 CONT.

YEAR	KPMCP PHARMACY PRESCRIPTION DATA	HRSR DRUG ORDER DATA	LILLY DIGEST DATA
1974	72.9	72.0	78.9
1975	82.5	82.1	84.9
1976	95.8	100.9	92.8
1977	100.0	100.0	100.0
1978	105.9	114.4	107.7
1979	113.5	128.5	117.7
1980	127.1	134.8	128.7

TABLE 3

FACTORS ASSOCIATED WITH INCREASES IN OREGON KPMCP OUTPATIENT PHARMACY COST INCREASES, 1972-1980

1972 COSTS	$2,268,815
1980 COSTS	$5,256,985
COST INCREASE, 1972-1980	$2,988,170

PROPORTION OF 1972-1980 COST INCREASE DUE TO:

INCREASE IN HEALTH PLAN MEMBERSHIP	41%
DECREASE IN DRUG ORDERS PER MEMBER	-2%
INCREASE IN RVS UNITS PER DRUG ORDER	18%
INCREASE IN DRUG CONSUMER PRICE INDEX	50%
DECREASE IN OTHER FACTORS (REAL PRICE CHANGES)	-7%

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APPENDIX III

Sampling Variance of Resource Use Rates by Physicians Based on a Random Sample of Subscriber Units

APPENDIX III

SAMPLING VARIANCE OF RESOURCE USE RATES BY PHYSICIANS BASED ON A RANDOM SAMPLE OF SUBSCRIBER UNITS

The outpatient data system of the Health Services Research Center (HSRC) is based on a random 5% sample of Kaiser-Permanente Medical Care Program (KPMCP) subscriber units. This sample was initiated in 1967 and has been updated since then by adding 5% of the new enrollee units each month. This technical note presents a method for estimating the sampling variance of resource use rates by physicians based on the 5% sample data.

The rate of resource use by a physician is defined as the average quantity of resources ordered or used by the physician per unit of patient contact. Laboratory tests, radiology tests, drug orders and other diagnostic and treatment services principally under the control of the physician are included in resource use measure which is expressed as total Relative Value Units or dollars. Various definitions of a patient contact can be used, including office visits and direct morbidity contacts. For definiteness the development that follows uses the term "visit" to denote the unit of patient contact.

The population resource use rate for physician k during the study period is defined as

$$R_k = \frac{\text{Total resources ordered or used by physician } k}{\text{Total visits to physician } k} \quad . \qquad (1)$$

The estimated rate based on the 5% sample data is defined by

$$\hat{R}_k = \frac{\text{Total resources attributable to physician } k \text{ in the 5\% sample}}{\text{Total visits to physician } k \text{ in 5\% sample}} \qquad (2)$$

If instead of a cluster sample of subscriber units there were simple random samples of the populations of visits to physicians, the estimation of the sampling variances of the resource use rates would be straight forward. Suppose there was a random sample of n_k visits to physician k, and let y_{kj} denote the quantity of resources ordered or used at the jth visit, then the estimated resource use rate or average quantity of resources per visit would be given by

$$\hat{R}_k = \frac{\sum_{j=1}^{n_k} y_{kj}}{n_k} \quad , \text{ and the sampling variance of } \hat{R}_k \qquad (3)$$

would be estimated by

$$\hat{\sigma}^2(\hat{R}_k) = \frac{1}{n_k(n_k-1)} \sum_{j=1}^{n_k} (y_{kj}-\hat{R}_k)^2 \tag{4}$$

Using expression (4) for rates estimated from a cluster sample of subscriber units would be incorrect. Appropriate methods, however, are available in the literature of cluster sampling (see for example, Sukhatme and Sukhatme 1970).

Denoting the number of visits to physician k involving individuals in the ith subscriber unit in the 5% sample by x_{ki}, and the quantity of resources ordered or used at such visits by y_{ki}, the estimated resources use for the ith subscriber unit is $\hat{R}_{ki} = \frac{y_{ki}}{x_{ki}}$, for $x_{ki} \geq 1$. (5)

Further, denote the number of subscriber units in the 5% sample which had at least one visit to physician k by n_k. Then the estimated resource use rate for physician k is given by

$$\hat{R}_k = \frac{\sum_{i=1}^{n_k} y_{ki}}{\sum_{i=1}^{n_k} x_{ki}} . \tag{6}$$

Applying results given by Sukhatme and Sukhatme (1970), the estimated sampling variance of $\hat{R}_k$ may be expressed as

$$\hat{\sigma}^2(\hat{R}_k) = \frac{(N_k-n_k)}{N_k n_k (n_k-1)} \sum_{i=1}^{n_k} \frac{x_{ki}^2}{\bar{x}_k^2} \left(\hat{R}_{ki}-\hat{R}_k\right)^2 , \tag{7}$$

where N_k is the number of subscriber units in the Health Plan population that had at least one visit to physician k during the study period. N_k is unknown and is replaced by its estimate $20n_k$ when computing expression (7). The average number of visits to physician k among subscriber units with at least one visit to physician k, $\bar{x}_k$, is defined as

$$\frac{1}{n_k} \sum_{i=1}^{n_k} x_{ki} .$$

When comparing resource use rates among physicians it is necessary to address the question of the comparability of patient characteristics which may influence the risk of resources being used or ordered by a physician. Some examples of potential risk factors are patient sex, age and presenting morbidity.

To simplify the following discussion, we use a single index j to denote subgroups or strata of visits based on these risk factors, singly or in combination. The estimated resource use rate for physician k specific to strata j is denoted by $\hat{R}_{kj}$, and for the ith subscriber unit by $\hat{R}_{kji}$.

Expression (7) may be modified in an obvious way to give the estimated sampling variance of the estimated resource use rate for physician k specific to the jth strata of risk factors,

$$\sigma^2(\hat{R}_{kj}) = \frac{(N_{kj}-n_{kj})}{N_{kj}n_{kj}(n_{kj}-1)} \sum_{i=1}^{n_{kj}} \frac{x^2_{kji}}{\bar{x}^2_{kj}} \left(\hat{R}_{kji}-\hat{R}_{kj}\right)^2 \qquad (8)$$

If the distributions of visits over these risk factors differ among physicians then adjusted rates, rather than crude rates, are required for valid comparisons among physicians. The following table will clarify the discussion of adjustment procedures.

TABLE 1: Frequency of Visits (x) and Quantity of Resources (y) by Risk Strata and Physician

	Physician					
Risk Strata	1	2	k	..	K	Total
1	$x_{11}y_{11}$		$x_{k1}y_{k1}$			$x_{.1}y_{.1}$
2	$x_{12}y_{12}$		$x_{k2}y_{k2}$			
⋮	⋮		⋮			
j	$x_{1j}y_{1j}$		$x_{kj}y_{kj}$			$x_{.j}y_{.j}$
⋮	⋮		⋮			
J	$x_{1J}y_{1J}$		$x_{kJ}y_{kJ}$			
	$x_{1.}y_{1.}$		$x_{k.}y_{k.}$			$x_{..}y_{..}$

There are two methods of standardization, direct and indirect standardization, for adjusting for differences of risk distributions. In both methods the overall distribution of risk given by the frequencies of visits in the total column is taken as the standard population to which adjustments are made. For a general discussion of these methods, the reader is referred to Chapter 13 of Fleiss, (1973). The direct method requires risk strata specific rates for each physician, which if the strata are small may be unreliable. The indirect method, on the other hand, only requires risk strata specific rates for the larger standard population.

The direct adjusted rate for physician k is defined as

$$DAR_k = \frac{\sum_{j=1}^{J} \hat{R}_{kj}\, x_{.j}}{x_{..}} , \tag{9}$$

for which the sampling variance is

$$\hat{\sigma}^2(DAR_k) = \frac{\sum_{j=1}^{J} x_{.j}^2\, \hat{\sigma}^2(\hat{R}_{kj})}{x_{..}^2} , \tag{10}$$

where the variance of $\hat{R}_{kj}$ is given by expression (8).

The indirect adjusted rate for physician k is defined as the ratio of the observed to the expected quantities of resources used by physician k times the crude rate in the standard population. The quantity of resources expected if the visits to physician k had the same risk distribution as the standard population is

$\sum_{j=1}^{J} x_{kj}\, \hat{R}_{.j}$, and the indirect adjusted rate is given by

$$IAR_k = \frac{R_{..}\, y_{k.}}{\sum_{j=1}^{J} x_{kj} \hat{R}_{.j}} \tag{11}$$

Since the combined sample of visits to all physicians is much larger than the sample of visits to physician k, the sampling variation in the crude rate of the standard population and the variation in the strata specific rates in the standard population can be ignored relative to the variation in the observed number of visits to physician k. The sampling variance of the IAR_k then becomes

$$\partial^2(IAR_k) = \left(\frac{R_{..}}{\sum_{j=1}^{J} x_{kj}\hat{R}_{.j}}\right)^2 \partial^2(y_{k.}) \quad . \qquad (12)$$

The variance of $y_{k.}$ required in expression (12) may be obtained from expression (8) since $y_{k.} = x_{k.}\hat{R}_{k.}$,

$$\partial^2(y_{k.}) = x^2_{k.} \frac{(N_{k.}-n_{k.})}{N_{k.}n_{k.}(n_{k.}-1)} \sum_{i=1}^{n_{k.}} \frac{x^2_{k.i}}{\bar{x}^2_{k.}} \left(\hat{R}_{k.i}-\hat{R}_{k.}\right)^2 \quad . \qquad (13)$$

APPENDIX IV

Age-Morbidity Groupings for Rate Computations

APPENDIX IV

AGE-MORBIDITY GROUPINGS FOR RATE COMPUTATIONS

Morbidity groups are based on the 10 Disease Classification

MEDICINE:	AGE	DISEASE CATEGORIES
	0-17	Acute(5,6) Other(0,1,2,3,4,7,8,9)
	18-34	Refractive,No Disease(0) Emotional Disease(2) Chronic Disease(3,4) Acute Disease(5,6) Symptoms(7) Trauma(9) Other-Requires Hosp.,Pregnancy(1,8)
	35-54	Refractive,No Disease(0) Emotional Disease(2) Chronic Disease(3,4) Acute Disease(5,6) Symptoms(7) Other-Requires Hosp.,Preg.,Trauma(1,8,9)
	55-64	Same morbidity categories as 35-54 age group
	65-74	Same morbidity categories as 35-54 age group
	75+	Refractive,No Disease(0) Chronic Disease(3,4) Acute Disease(5,6) Symptoms(7) Other-Requires Hosp.,Emot.,Preg.,Trauma(1,2,8,9)
PEDIATRICS:		
	0-1	Refractive,No Disease(0) Chronic Disease(3,4) Acute Disease(5,6) Symptoms(7) Other-Requires Hosp.,Emot.,Preg.,Trauma(1,2,8,9)
	2-5	Same morbidity categories as 0-1 age group
	6-12	Same morbidity categories as 0-1 age group
	13-19	Same morbidity categories as 0-1 age group
	20+	This category should be deleted

OB-GYN:	AGE	DISEASE CATEGORIES
	0-19	Pregnancy(8) Other-Refractive,No Disease;Requires Hosp.; Emot.;Chronic;Acute;Symptoms;Trauma (0,1,2,3,4,5,6,7,9)
	20-34	Refractive,No Disease(0) Chronic Disease(3,4) Acute Disease(5,6) Symptoms(7) Pregnancy(8) Other-Requies Hosp.,Emot.,Trauma(1,2,9)
	35-49	Refractive,No Disease(0) Chronic Disease(3,4) Symptoms(7) Other-Requires Hosp.,Emot.,Acute,Preg.,Trauma (1,2,5,6,8,9)
	50+	Chronic Disease(3,4) Other-Refractive,No Disease;Requires Hosp.; Emot.;Acute;Symptoms;Preg.;Trauma (0,1,2,5,6,7,8,9)
Surgery:		
	0-17	All(0,1,2,3,4,5,6,7,8,9)
	18-34	Chronic Disease(3,4) Other-Refractive,No Disease;Requires Hosp.; Emot.;Acute;Symptoms;Preg.;Trauma (0,1,2,5,6,7,8,9)
	35-54	Same morbidity categories as 18-34 age group
	55-64	Same morbidity categories as 18-34 age group
	65+	Requires Hospitalization(1) Chronic Disease(3,4) Other-Refractive,No Disease;Emot.;Acute; Symptoms;Preg.;Trauma(0,2,5,6,7,8,9)

NOTE: -1,10, and 99 are excluded from all age categories.

Exclude direct contacts for physicians in following specialties.

1978 EXCLUSIONS

PHYSN	SPECIALTY GROUP	NO.CONTACTS
25	Other	13
76	Medicine	5
115	Medicine	120
131	Medicine	17
144	Other Specialty(Emergency Care)	6
151	Other Specialty(Allergy)	13

1977 EXCLUSIONS

PHYSN	SPECIALTY GROUP	NO.CONTACTS
31	Other Surgery(Orthopedics)	3
76	Medicine	10
100	Ob-Gyn	1
107	Ob-Gyn	3
129	Ob-Gyn	3
131	Medicine	16
151	Other Specialty(Allergy)	31

1976 EXCLUSIONS

PHYSN	SPECIALTY GROUP	NO.CONTACTS
17	Ob-Gyn	3
31	Other Surgery(Orthopedics)	14
49	Ob-Gyn	5
100	Ob-Gyn	8
126	Ob-Gyn	8
129	Ob-Gyn	12
131	Medicine	13
151	Other Specialty(Allergy)	48

NOTE: Doctor 143 is presently labelled specialty 01 for 1976 and 1977 in error. He is a dermatologist (specialty 02, specialty recode 6). Please change his specialty accordingly.

APPENDIX V

Definition of Independent Variables

INDEPENDENT VARIABLES

Variable	Data Source	Definition*
Medical Training Years Since Graduation	Physicians Survey	This was calculated by subtracting the year each physician received his M.D. degree from the year 1977.
Age	Physician Demographic and Professional Background File	This was calculated by subtracting the birth year of each physician from the year 1977.
Public or Private Medical School	Physician Demographic and Professional Background File	Each physician's medical school was identified from the AMA Directory or administrative records. Physicians were then categorized into private or public based on information from: Association of American Medical Colleges. AAMC Directory of American Medical Education, 1980-81.
Medical School Prestige	Physician Demographic and Professional Background File	A 1977 study, "The Reputation of American Medical Schools" by Lipton and Cole ranked American medical schools by prestige (see Cole JR, Lipton JA. The reputation of American medical schools, Social Forces 55(3):662-682, March 1977.) The study was based on a sample of full-time clinical and basic science medical school faculty and included 94 medical schools. A prestige score was derived for each U.S. medical school based on the perceptions of the above faculty members. These same prestige scores were then applied to Kaiser-Permanente physicians to reflect the relative prestige of their medical school training.
Residency-University Affiliated	Physican Demographic and Professional Background File	Physicians were categorized according to whether or not their residency training took place in a university medical school/center environment or community hospital setting. Information on residency was obtained from the AMA Directory and administrative records. University affiliation was determined from the AAMC Directory of Medical Education, 1980-81, and the 1980 edition American Hospital Association's Guide to the Health Care Field.
Percent of Practice Devoted to Subspecialty	Physicians Survey	This variable was based on a question in the survey. Physicians were asked, "Do you now have a field of subspecialization?; If yes, what is your field of subspecialization?; ... "About what proportion of your practice is restricted to this field?" The actual percent as reported by the physician was then used as the basic measure.

*Note: Variables generally were divided in two or three groups with an equal number of physicians in each group for the bivariate analyses. If the variable was continuous, Pearsonian correlations were also calculated.

INDEPENDENT VARIABLES - (Continued)

Variable	Data Source	Definition
Professional/Scientific Activities and Orientation		
Number of Seminars, Courses Attended	Physicans Survey	This variable was based on the survey question, "Other than internships and residencies, have you attended any post-graduate seminars, courses, or other types of formal instruction during the past five years or so? If Yes, how many courses or seminars have you attended?" The actual number reported by each physician was recorded.
Scientific Papers Published/Presented	Physicians Survey	This variable was based on a question in the survey which asked, "Have you presented or published any scientific papers during the last five years or so?"; no and yes were the answer categories.
Teaching Medical School Now	Physician Demographic and Professional Background File	This variable was derived from a data report of the NWPCC (the medical group) which lists information on each physician's background including medical school teaching. If the report indicated that a physician had a medical school appointment or was teaching in a medical school, the physician was recorded as being involved in teaching. If not mentioned, the physician was not considered to be teaching.
Prior Practice Experience, Location of Current Practice		
Prior Practice Experience	Physicians Survey	This variable was based on a survey question which asked: "What type of practice were you in before coming to the Permanente Clinic here in Portland?" Physicians who answered institutional practice (e.g., VA), solo-fee-for-service, fee-for-service, group practice, U.S. Armed Forces, and prepaid group practice were categorized as other. Those checking "was in residency" were categorized accordingly.
Location of Current Practice	Health Plan Documents	Practice location was determined from a list indentifying the physician's current practice assignment at the time of the survey. Those practicing at Kaiser-Permanente's two hospital ambulatory care services were categorized under hospital clinic. Physicians assigned to other ambulatory care facilities were recorded as practicing in the free-standing clinics.

INDEPENDENT VARIABLES (Continued)

Variable	Data Source	Definition
Style, Risk-Taking Orientation		
Compared to Colleagues in Department - Self-Assessment of Conservatism, Practice	Physicians Survey	This variable was based on responses to the question: "Compared to your colleagues in your department, would you generally consider yourself somewhat more conservative (clinically cautious) or somewhat less conservative in your approach to practice?" Somewhat more conservative, somewhat less conservative, about the same as colleagues, were the categories physicians could check. These were collapsed into two groups: somewhat more conservative and somewhat less or about the same.
Trend Over Time - Becoming More, Less Conservative in Practice Patterns	Physicians Survey	This variable was based on responses to the question: "Since you first started practicing, have you tended to grow somewhat more conservative in the way you practice, somewhat less conservative, or hasn't there been much difference?" The answer categories were collapsed into two groups: more conservative and less conservative or the same.
Antibacterial Treatment for Infection	Physicians Survey	These variables were derived from the survey question: "One problem in quality of care is the use of antibacterials in an ambiguous clinical situation. This raises questions about the proper balance between the risks of not treating patients who may need antibacterial treatment (false-negatives) and the risks of giving the treatment to patients who do not need it (false-positives). In the following typical examples, we would like to know if you would likely give antibacterial treatment for the conditions indicated:
Males		Patient coming in with dysuria and frequency with no pus in urine. Would you treat for infection with antibacterials? The categories were 'probably yes' and 'probably no.'
Females		Patient coming in with dysuria and frequency with no pus in urine. Would you treat for infection with antibacterials? The categories were 'probably yes' and 'probably no.'
Antibacterial Treatment for Infection - Tonsils	Physicians Survey	Would you likely give antibacterial treatment for an infection of tonsils without results of a throat culture? The categories were 'probably yes' and 'probably no.'
Antibacterial Treatment for Infection - Gonorrhea	Physicians Survey	Young unmarried women with symptoms of PID and recent sexual exposure, with negative smear and culture. Would you treat for gonorrhea? The categories were 'probably yes' and 'probably no.'"

INDEPENDENT VARIABLES (Continued)

Variable	Data Source	Definition
Style/Social Orientation to Medicine		
Social Orientation to Medicine	Physicians Survey	This measure was based on responses to the survey question: "The following list represents some of the services which may be provided by a medical care program like Kaiser-Permanente. Do you favor or oppose providing each of these services on an organized basis in the Oregon Region?" The categories used were "favor" and "oppose." The organized services listed were obesity, physical and mental rehabilitation, alcoholism, disturbances in sexual relations, and drug abuse. Physicians who answered favor in all services or at least three of the five services were grouped under favor; the rest were classified as opposed, i.e., low on social orientation.
Interest: Psycho/Social Aspects of Medicine	Physicians Survey	This variable was based on responses to the survey question: "The following are topics which some physicians say they would like to know more about. How interested are you in each? ... personality, psychosomatic medicine and related aspects." The possible answer categories were very interested, somewhat interested and not interested. These were collapsed into very interested and somewhat, not interested.
Importance of Interpersonal Element	Physicians Survey	Responses to the following survey question were used for this variable: "Physicians differ in their views about how much clinical difference the interpersonal element between doctor and patient really makes in diagnoses and treatment. In most of the cases in your practice, how clinically important is the interpersonal element?" The answer categories were: very important in most cases, of some importance in most cases, and not really important except in special cases. These were further collapsed into two groups: very important and some or not really important.
Orientation to Patients		
Desirability of "Regular Doctor"	Physicians Survey	This variable was based on responses to the question: "One hears a good deal about the importance to good health care of having a 'regular doctor'. How desirable is it for a patient to have a regular physician in contrast to getting care from any one of a number of qualified physicians?" Answer categories were: very preferable, marginally preferable, makes no difference. Based on their answers, physicians were categorized into two groups: very preferable and marginally preferable, makes no difference.

INDEPENDENT VARIABLES (Continued)

Variable	Data Source	Definition
Orientation to Patients (continued)		
Percent of Patients Troublesome	Physicians Survey	This variable was based on responses to the survey question: "How about your patients: all in all, about what percent of your patients present you with troublesome problems in doctor-patient relations?" The percent reported by the physician was recorded.
Percent Patient Visits Trivial	Physicians Survey	This variable was based on answers to the survey question: "In an average month, about what proportion of your patient visits would you say were unnecessary, that is, for trivial complaints that didn't require a physician visit?" The percent reported by the physician was recorded.
Problem: Patient Overconcern of Symptoms	Physicians Survey	This variable was based on responses to the question: "So far we've dealt with the patients' complaints about their physicians. The following is a list of some problems that physicians encounter with patients. How large a problem is each in your practice--a troublesome problem, somewhat of a problem, or little or no problem?" - Overconcern with minor symptoms, running to a doctor for every little thing.
Problem: Patients Neurotic Personality	Physicians Survey	- Neurotic personality Based on their answers, physicians were divided into two categories: troublesome problem and somewhat of a problem, little or no problem.
Class Coverage (Level of Benefits)		
Does Class Coverage Influence Resources Ordered	Physicians Survey	This variable was based on responses to the question: "When treating patients, how aware are you of the patients' Health Plan classification--whether they are required to pay out-of-pocket for some services?" The categories available were: not usually aware or aware in some or most cases. If "aware in some or most cases" was chosen, then a follow-up was used to assess the level of awareness of class of coverage. The categories listed were: aware in some cases: patient's class of coverage usually has an influence--tend to order fewer if medically feasible; aware in some cases: patient's class of coverage has little or no influence; aware in most cases: patient's class of coverage usually has an influence--tend to order fewer if medically feasible; or aware in most cases: patient's class of coverage has little or no influence. These were further collapsed into two groups: has influence and has little or no influence.

INDEPENDENT VARIABLES (Continued)

Variable	Data Source	Definition
Attitudes Toward Utilization		
Physicians Too Dependent on Aids/Consultations	Physicians Survey	This variable was based on responses to the question: "An argument in medicine is that the physician is becoming too dependent on the use of diagnostic aids and on consultants and less confident in his own skills and competence. Do you agree or disagree with this view?" The answer categories were: definitely agree, agree, disagree, and definitely disagree. Based on their answers, physicians were grouped into two categories: agree and disagree.
Could Use of Tests Be Reduced	Physicians Survey	This variable was based on responses to the question: "Some physicians are concerned about the growing use of diagnostic tests. In your judgment, could the use of lab and other diagnostic tests be reduced without adversely affecting patient care." The answer categories were yes and no.
Length of Time in Group/Formal Authority		
Years with Kaiser-Permanente	Physicians Survey	This variable was based on responses to the question: "How long have you been with The Permanente Clinic here in the Oregon Region? The number of years was recorded for each physician.
Formal Authority (Administrative Office in Medical Group)	Physicians Survey	This variable was based on responses to the following question: "Have you ever held any of the following offices in the medical group here? Member of The Permanente Clinic Executive Committee, Department Chief, Clinic Professional Director." If physicians answered "yes, currently" or "yes, in the past" to any of the three items, they were categorized as having formal authority. If they answered "never" on each item, they were grouped in the no authority category.

INDEPENDENT VARIABLES (Continued)

Variable	Data Source	Definition
Social Integration, Informal Influence, Leadership		
Close Friends in Group	Physicians Survey	This variable was based on the question: "Of all your close, personal friends, about how many are members of the medical group here in Portland—most of your close friends, many but not most, only a few, or none. Physicians were grouped into two categories: most, many and few, none.
Friendship Choices	Physicians Survey	This variable was based on the sociometric question: "Would you please give the names of your three or four closest friends here in the medical group?" The number of choices received by each physician was summed and used for this measure.
Number of Times Consulted Per Month about Drug Therapy	Physicians Survey	This variable was based on the question: "In an average month, how many times are you contacted by other physicians for consultation on questions of drug therapy?" The actual number reported was recorded.
Most Likely to Consult on Drugs	Physicians Survey	This variable was based on the sociometric question: "Would you please name the physicians in your department whom you would most likely consult on questions of therapeutics." The number of choices received by each physician was summed and used for this measure.
Most Respect - Patient Relations	Physicians Survey	This variable was based on the sociometric question: "Would you name the two or three physicians in your department who in your judgment have the best reputation for getting along with patients—for having the best physician-patient relationships. The number of choices received by each physician was summed and used for this measure.
Influence—How Things Are Run in Kaiser-Permanente	Physicians Survey	This variable was based on the sociometric question: "Would you list the names of the physicians who, in your judgment, have the greatest influence on how things are run in The Permanente Clinic as a whole?" The number of choices received by each physician was summed and used for this measure.
Influence - How Things Are Run in Department	Physicians Survey	This variable was based on the sociometric question: "Now, would you list names of the physicians who, in your judgment, have the greatest influence on how things are run in your department?" The number of choices received by each physician was summed and used for this measure.

INDEPENDENT VARIABLES (Continued)

Variable	Data Source	Definition
Social Integration, Informal Influence, Leadership (continued)		
Respect - Overall Leadership in Kaiser-Permanente	Physicians Survey	This variable was based on the sociometric question: "Would you please name the three or four people in The Permanente Clinic whose overall leadership on issues facing the Group you most respect?" The number of choices received by each physician was summed and used for this measure.
Respect - Competence in Department	Physicians Survey	This variable was based on the sociometric question: "Would you name the two or three physicians in your department whose competence as a physician you respect?" The number of choices received by each physician was summed and used for this measure.
Respect - Competence in Kaiser-Permanente	Physicians Survey	This variable was based on the sociometric question: "Would you now name the two or three physicians in the medical group as a whole, other than those in your department, whose competence as physicians you think is the most outstanding?" The number of choices received by each physician was summed and used for this measure.
Most Outstanding Overall in Kaiser-Permanente	Physicians Survey	This variable was based on the sociometric question: "Finally, would you name the two or three physicians in the group as a whole who you think are the most outstanding in all respects--for whom you have, overall, the most respect and regard?" The number of choices received by each physician was summed and used for this measure.
Loyalty/Commitment to Kaiser-Permanente, Medical Group		
Loyalty for Kaiser-Permanente in Oregon	Physicians Survey	This variable was based on responses to the question: "Another characteristic of organizations is the loyalty of members. Would you indicate how much loyalty you feel towards ...the Kaiser-Permanente organization in Oregon?" Physicians were categorized into two groups: loyal to Kaiser-Permanente and neutral.
Most in Common with Other Kaiser-Permanente Medical Groups or Your Specialty in Portland	Physicians Survey	This variable was based on responses to the question: "What physician group do you feel you have most in common with?" The answer categories were: Physicians in other Kaiser-Permanente medical groups, physicians in your specialty in the Portland community, and same. Based on their answers, physicians were grouped into two groups, Physicians in other K-P medical groups and physicians in your specialty in the Portland community, same.

INDEPENDENT VARIABLES (Continued)

Variable	Data Source	Definition
Loyalty/Commitment to Kaiser-Permanente, Medical Group (continued)		
Choose Medical Group Again	Physicians Survey	This variable was based on responses to the survey question: "If you could choose all over again, would you choose The Permanente Clinic as a place to practice?" The answer categories were: would definitely choose The Permanente Clinic; would probably choose The Permanente Clinic; not sure whether would choose The Permanente Clinic or not; would probably not choose The Permanente Clinic; and would definitely not choose The Permanente Clinic. Physicians were grouped into two categories: those who would definitely choose The Permanente Clinic and those who chose any of the remaining four items.
Work Related Factors		
Patient Load About Right	Physicians Survey	This variable was based on responses to the question: "In order to do a good job, is this about the right patient load for the number of hours you work, too high, or could you see more patients?" Based on their answers, physicians were grouped into two categories: about right, could see more and too high.
Satisfied with Size, Managability of Patient Load	Physicians Survey	This variable was based on responses to the question: "In general, how satisfied or dissatisfied are you now with the size, managability of your patient load?" The categories available were very satisfied, fairly satisfied, fairly dissatisfied, and very dissatisfied. Physicians were classified as satisfied or dissatisfied.
Compare Group to Traditional Practice: Stability of Patient Relations	Physicians Survey	This variable was based on responses to the question: "Compared to a traditional private practice, does practicing here in the group make it easier or harder for you to maintain stable relationships with patients?" Based on their answers, physicians were grouped into group makes easier or same and group makes harder.
Compare Group to Traditional Practice: Number of Patients Seen Per Day	Physicians Survey	This variable was based on responses to the survey question: "We would like you to compare your practice in the medical group with traditional private practice. How do you think your practice compares with traditional private practice on the number of patients seen per day, i.e., patient load?" The categories were: higher in group; about the same; and lower in group. Based on their responses, physicians were grouped into two categories: higher and same, lower.

INDEPENDENT VARIABLES (Continued)

Variable	Data Source	Definition
Work Related Factors (continued)		
Proportion Patient Load Physician Regular Doctor	Physicians Survey	This variable was based on responses to the question: "For about what proportion of your patient load are you their regular doctor---the person they keep coming back to whenever they need care?" The percent reported by each physician was recorded.
Caseload	5% Sample, Outpatient System	This variable was defined as the number of different patients seen by each physician divided by the number of his/her respective clinic hours.
Workload	Physician Availability File	This variable was defined as the total number of patients seen divided by the number of his/her respective clinic hours.

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